

# Snow-bed communities with dominant *Salix herbacea* in the Julian Alps

Andrej Martinčič<sup>1</sup>, †Tone Wraber & Igor Dakskobler<sup>2,\*</sup>

**Key words:** phytosociology, plant ecology, synsystematics, *Salicetea herbaceae*, *Salicetum retuso-herbaceae*, *Polytrichetum sexangulare*, Julian Alps, Triglav National Park, Slovenia, Italy.

**Ključne besede:** fitocenologija, ekologija rastlin, sinsistematika, *Salicetea herbaceae*, *Salicetum retuso-herbaceae*, *Polytrichetum sexangulare*, Julijske Alpe, Triglavski narodni park, Slovenija, Italija.

## Abstract

In the alpine belt of the Julian Alps (glacial cirque Na Jezerih under Mt. Veliki Rokav, Jarečica, the Mangart Saddle and Prodi under Mt. Mangart as well as Mt. Plešivec in the rock wall of Loška Stena) we studied the phytosociology and ecology of snow-bed vegetation with dominating flowering plants *Salix herbacea*, *Luzula alpinopilosa*, *Gnaphalium supinum*, *Soldanella pusilla* and *Salix retusa*, and numerous moss species. Based on the comparison with similar snow-bed communities in the Central, Eastern and Southern Alps we described a new association *Salicetum retuso-herbaceae* and classified it into the alliance *Salicion herbaceae* and class *Salicetea herbaceae*. We determined several successional stages of snow-bed vegetation on mixed calcareous-silicate bedrock that we treat as variants, in two relevés also the initial association *Polytrichetum sexangulare*.

## Izvleček

V alpskem pasu Julijskih Alp (ledeniška krnica Na jezerih pod Velikim Rokavom, Jarečica, Mangartsko sedlo in Prodi pod Mangartom ter Plešivec v Loški steni) smo fitocenološko in ekološko preučili vegetacijo snežnih dolinic s prevladujočimi cvetnicami *Salix herbacea*, *Luzula alpinopilosa*, *Gnaphalium supinum*, *Soldanella pusilla* in *Salix retusa* ter številnimi mahovnimi vrstami. Na podlagi primerjave s podobnimi združbami snežnih tal v Centralnih, Vzhodnih in Južnih Alpah smo opisali novo asociacijo *Salicetum retuso-herbaceae*, ki jo uvrščamo v zvezo *Salicion herbaceae* in razred *Salicetea herbaceae*. Ugotovili smo več različnih razvojnih stopenj rasti na snežnih tleh na mešani karbonatno-silikatni podlagi, ki jih vrednotimo kot variante, le v dveh popisih tudi inicialno asociacijo *Polytrichetum sexangulare*.

**Received:** 11. 5. 2018

**Revision received:** 31. 8. 2018

**Accepted:** 5. 9. 2018

1 Zaloška 78 a, SI-1000 Ljubljana, Slovenia. E-mail: andrej.martincic@siol.net

2 Scientific Research Centre of the Slovenian Academy of Sciences and Arts, Institute of Biology, Regional unit Tolmin, Brunov dvorec 13, SI-5220 Tolmin, Slovenia. E-mail: Igor.Dakskobler@zrc-sazu.si.

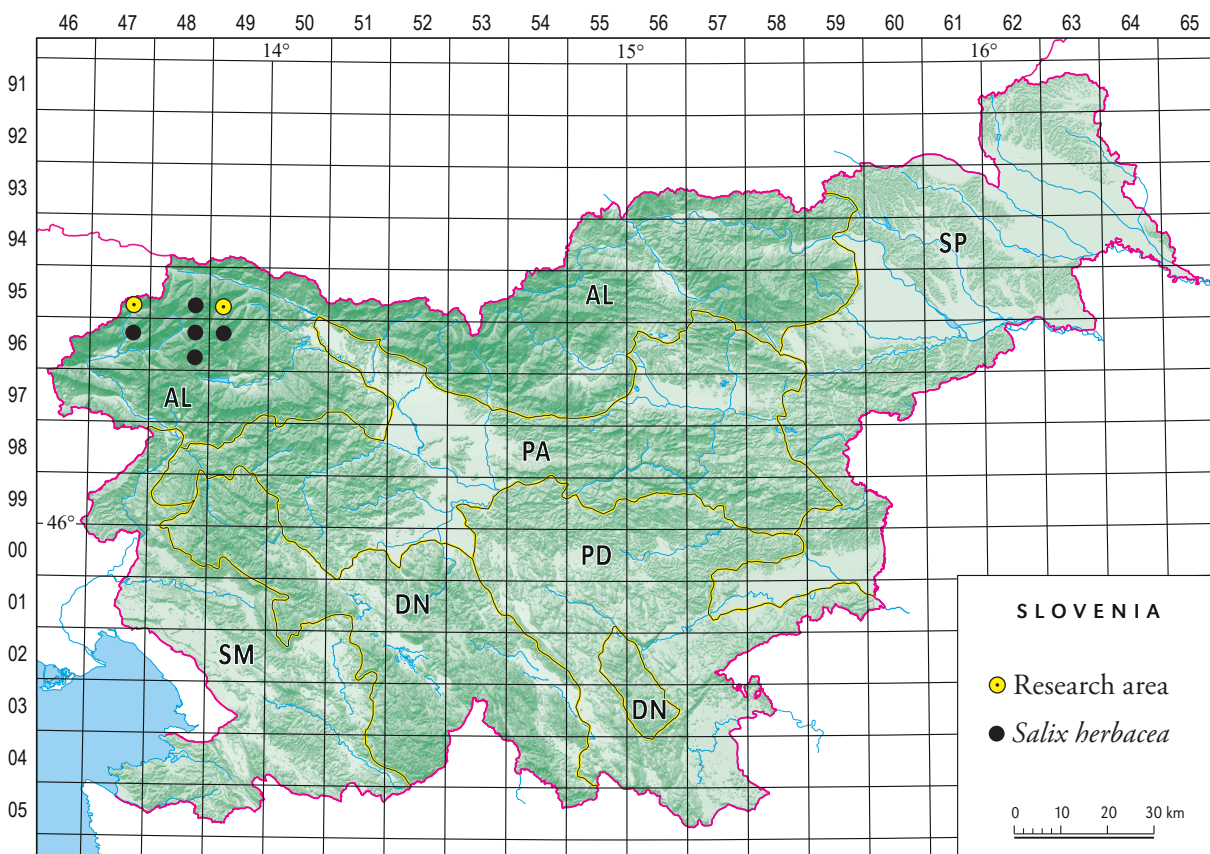
\* Corresponding author.

## 1. Introduction

Alpine-subnival or snow-bed communities in the Slovenian Alps are confined to areas with long-lasting snow cover that receive a continued supply of snow water (the soil is waterlogged due to snowmelt). The most characteristic snow-bed communities (class *Salicetea herbaceae*) are distributed only on small areas, mostly in stands of the associations *Polytrichetum sexangularis* (syn. *Polytrichetum norvegicae*), *Salicetum herbaceae* s. lat. and *Luzuletum alpinopilosae* (T. Wraber 1996a: 109–110). More widely distributed is vegetation of snow-beds on stabilised calcareous screes with some other willows like *Salix retusa* and *S. reticulata* (alliance *Arabidion caeruleae*). The dwarf willow community (*Salicetum herbaceae* s. lat.) or its stands were reported for areas under Mt. Mangart, in the Škrlatica group, on the Kriški Podi plateau and on Mt. Stol in the Karavanke Mts. (Aichinger 1933: 53–54, T. Wraber in Hegi et al. 1982: 31, T. Wraber 1996a: 109–110, 1996b: 93). Only one relevé has been published so far for the association *Salicetum herbaceae* s. lat. (T. Wraber 1972: 61, Šilc & Čarni 2012: 136). Aichinger (ibid.)

published only the species composition of the stand in the corner between both summits of Mt. Stol: *Salix herbacea*, *Sibbaldia procumbens*, *Gnaphalium supinum*, *Anthelia juratzkana*, *Potentilla aurea*, *Sagina saginoides*, *Poa alpina* and *Polytrichum juniperinum*. The current distribution of dwarf willow in Slovenia is shown in Figure 1.

A detailed study of the phytosociology and ecology of stands with dominating *Salix herbacea* in the Julian Alps was conducted by Andrej Martinčič and late Tone Wraber (1938–2010) in early September 1968 in the Škrlatica group, the cirque Na Jezerih (Na Jezeru) under Visoki Rokav (9549/3) – Figure 7, and two years later, at the beginning of September 1970, under Mangart (on the Mangart Saddle, in the hollow Prodi) – Figure 6 – quadrant 9547/4. During this research, Andrej Martinčič collected and subsequently determined moss species as well as conducted field measurements of ecological variables (in particular pH). The field material, however, was not processed and published due to Tone Wraber's disease and untimely death. A few years be-



**Figure 1:** Distribution of *Salix herbacea* in Slovenia and approximate designation of the research area  
**Slika 1:** Razširjenost vrste *Salix herbacea* v Sloveniji in približna oznaka raziskovalnega območja

fore he died Wraber had told Igor Dakskobler about his intention to process the field material with Andrej Martinčič. Thanks to Wraber's heirs (widow, son and daughter) and Jože Bavcon, the head of the Botanical Garden of the University of Ljubljana, the professional manuscript legacy of Tone Wraber has been preserved in Wraber's library at the Botanical Garden and is available for researchers to examine. Having studied the phytosociological relevés of other alpine communities in Wraber's field notes on several occasions, we came across the relevés of snow beds as well. Since the co-author of those relevés, Andrej Martinčič, is still a prolific researcher, we wanted to finish what late Tone Wraber had started, i.e. conduct a phytosociological analysis of his relevé material on dwarf willow communities and Igor Dakskobler's relevés from Mt. Mangart and Mt. Plešivec in the Loška Stena rock wall (both in quadrant 9547/4) and classify the determined communities within the applicable syntaxonomic system.

## 2. Methods

Snow-bed communities with dominant *Salix herbacea* were studied applying the Braun-Blanquet method (Braun-Blanquet 1964). The relevés were entered into the FloVegSi database (Fauna, Flora, Vegetation and Paleovegetation of Slovenia) of the Jovan Hadži Institute of Biology at ZRC SAZU (T. Seliškar et al. 2003). Their arrangement in Table 1 is based on hierarchical classification. We transformed the combined cover-abundance values with numerical values (1–9) according to van der Maarel (1979). Numerical comparisons were performed with the SYN-TAX 2000 program package (Podani 2001). The relevés were compared by means of “(unweighted) average linkage method” – UPGMA, using Wishart's similarity ratio. Communities from Slovenia (some relevés on Mt. Mangart are in the territory of Italy) were compared with similar, already described communities in the Alps. We constructed a synoptic table (Table 2). Hierarchical classification was employed in this comparison as well, and the same method was used as in our comparison of individual relevés, but the measure of dissimilarity was also Jaccard's Index. The first author, Andrej Martinčič, conducted on-site pH measurements of the soil samples in water solution, using a battery-operated Iskra pH metre.

The nomenclatural sources for the names of vascular plants are the Mala flora Slovenije (MFS – Martinčič et al. 2007) and Flora alpina (Aeschimann et al. 2004). The nomenclature of Flora alpina – *Sesleria caerulea*, *Gnaphalium supinum* was used for the taxa *Sesleria caerulea* subsp. *calcaria* and *Omalotheca supina* (MFS). Ros et al. (2007) is the nomenclatural source for the names of liverworts (*Marchanthiophyta*), Ros et al. (2013) for the names of

mosses and Wirth (1995) and Suppan et al. (2000) for the names of lichens. For the names of syntaxa we follow Englisch (1993, 1999), Grabherr & Mucina (1993), Theurillat (2004), Šilc & Čarni (2012) and Mucina et al. (2016). In the classification of vascular species into phytosociological groups (groups of diagnostic species) we mainly refer to the Flora alpina (Aeschimann et al. 2004). Our classification of bryophytes is based on Oberdorfer (1992), Englisch (1993, 1999) and the expertise of the first author (Andrej Martinčič). The geographic coordinates of relevés were based on the Slovenian geographic coordinate system D 48 (zone 5) on the Bessel ellipsoid and with Gauss-Krüger projection.

### 2.1 Ecological conditions in the studied communities with *Salix herbacea*

All the relevés discussed in this article were made in the alpine belt of the Julian Alps, most of them only on five localities: three under Mangart (the Mangart Saddle, Prodi, Jarečica), one on Na Jezerih below Visoki Rokavi, and one on Plešivec in the Loška Stena group, at elevations between 1,950 and 2,220 m. The geological bedrock in the study area is mainly limestone and dolomite limestone interlayered with more silicate rocks, marlstone, claystone and chert, often also fine gravel (Buser 2009). Soils are initial (lithosols, very shallow molic gleysols or even histosols), often with mull humus (Vidic et al. 2015, Vrščaj et al. 2017).

The climate in the study area is montane, with mean annual precipitation of 2,000 to 2,500 mm (Zupančič 1998) and mean annual air temperature of -2 °C to 0 °C (Cegnar 1998). The researched stands are usually covered with snow from November to June. The growing season usually lasts three to four months, from June to the end of September (or beginning of October). The communities with *Salix herbacea* are often associated with specific sites, both in terms of terrain, soil conditions and the local climate.

## 3. Results and discussion

### 3.1 Soil analysis

Although the parent material and the soil in individual research plots differ, pH measurements revealed that the soil in dwarf willow stands is always acidic. Soil pH values at Na Jezerih below Rokavi ranged between 4.5 and 5.6; the pH value in most of the samples was 4.8 to 5.3. In several cases measurements showed an increased pH value

(5.6) at the depth of 5–10 cm, and in some cases lower values were determined (with pH 4.1 being the lowest). Soil samples from the Mangart Saddle had pH values ranging from 4.7 to 5.3; the most frequent pH values were around 5.

## 3.2 Description of the investigated communities

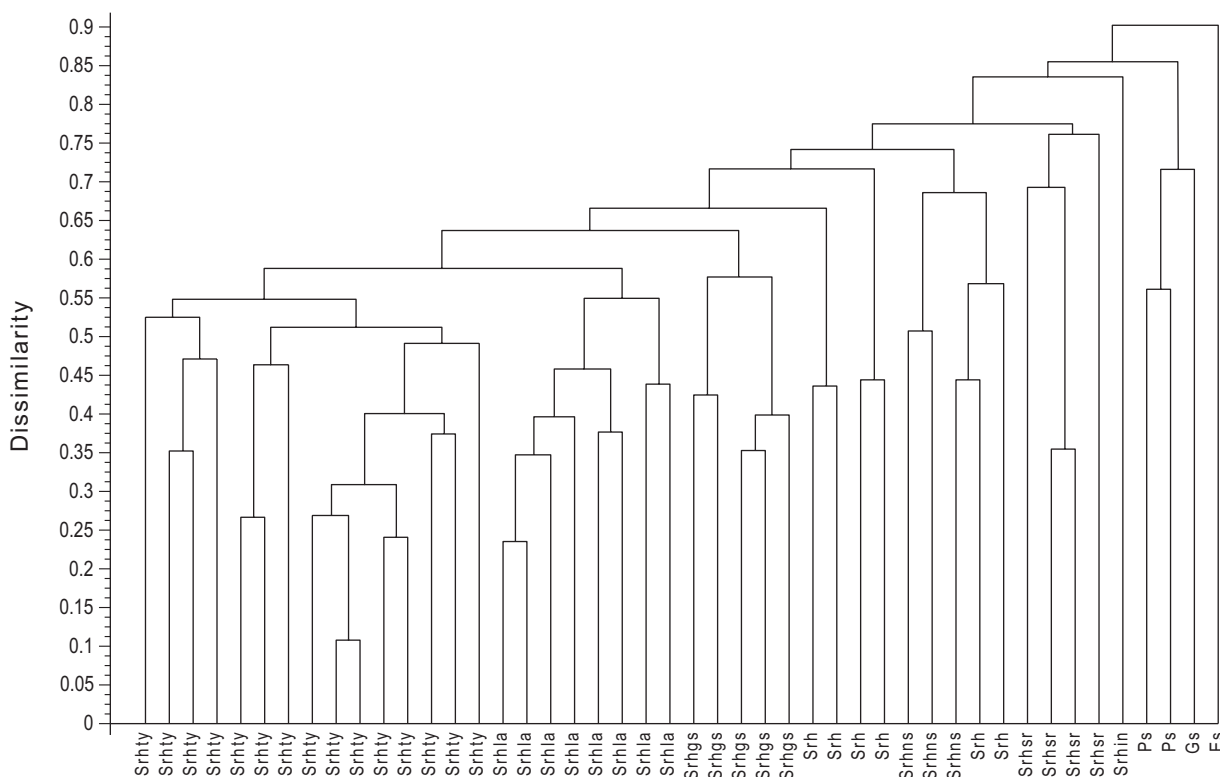
### 3.2.1 Hierarchical classification of relevés

In hierarchical classification, 46 snow-bed stands in the Julian Alps that are usually dominated by *Salix herbacea* grouped as demonstrated in Figure 2. In Table 1 they are

arranged in the same order, with the exception of several relevés in the right part of the dendrogram.

### 3.2.2 Comparison of *Salix herbacea* communities in the Julian Alps with similar communities in the Alps

In the next step we made a synoptic table (Table 2) comprising 23 relevés from Table 1, which grouped on the left side of the dendrogram in Figure 2 (the stands marked as Srhty and Srhla), and different forms of communities with dominant *Salix herbacea* in the Central and Eastern Alps, and compared them through hierarchical classification (Figures 3 and 4).



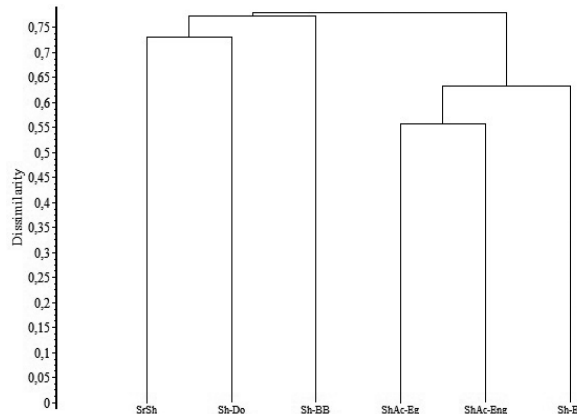
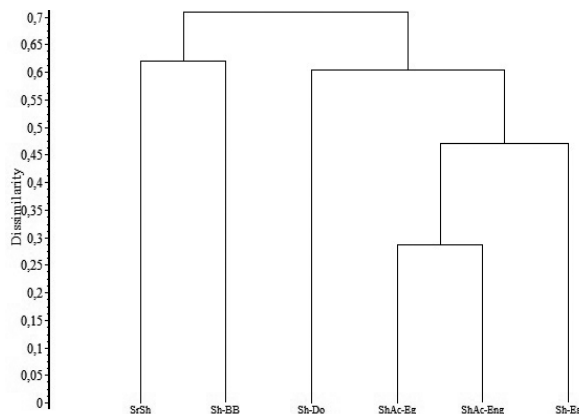
**Legend /Legenda:**

- Srhty *Salicetum retuso-herbaceae* var. *typica*
- Srhla *Salicetum retuso-herbaceae* var. *Luzula alpinopilosa*
- Srhgs *Salicetum retuso-herbaceae* var. *Gnaphalium supinum*
- Srhns *Salicetum retuso-herbaceae* var. *Nardus stricta*
- Srhsr *Salicetum retuso-herbaceae* var. *Salix retusa* prov.

- Srh *Salicetum retuso-herbaceae* s. lat.
- Srhin *Salicetum retuso-herbaceae* initial stand
- Ps *Polytrichetum sexangularis*
- Gs *Gnaphalium supinum* community
- Es *Salici herbaceae-Eriophoretum scheuchzeri* nom. prov. (*Salix herbacea-Eriophorum scheuchzeri* community)

**Figure 2:** Dendrogram of alpine snow-bed communities with dominant *Salix herbacea* from the Julian Alps UPGMA, complement of similarity ratio

**Slika 2:** Dendogram alpinskih združb snežnih dolinic s prevladujočo vrsto *Salix herbacea* v Julijskih Alpah, UPGMA, komplet Wishartovega koeficienta podobnosti



Legend to Figures 3 and 4 / Legenda k slikam 3 in 4

SrSh *Salicetum retuso-herbaceae*, Julian Alps, this article, relevés 1–23 in Table 1

Sh-Do *Salicetum herbaceae*, Dolomites, E. Pignatti & S. Pignatti (2014, 2016: Association Table 12.3);

Sh-BB: *Salicetum herbaceae*, Central Alps, Braun-Blanquet & Jenny 1926, Table VI, Columns 13–24;

Sh-Eg *Salicetum herbaceae*, Ammergauer Alps, Eastern Alps, Eggensberger 1994, Table 15, Columns 28–30;

ShAc-Eg *Arabidetum caeruleae salicetosum herbaceae*, Ammergauer Alps, Eastern Alps, Eggensberger 1994, Table 15, Columns 21–27;

ShAc-Eng *Salici herbaceae-Arabidetum caeruleae* var. *Pritzelago alpina-Salix retusa*, Eastern Alps, Englisch 1999: Table E, Columns 40–70.

**Figure 3:** Dendrogram of alpine snow-bed communities with dominant *Salix herbacea* from Central, Southern and Eastern Alps, UPGMA, complement of similarity ratio

**Slika 3:** Dendrogram alpskih združb snežnih dolinic s prevladujočo vrsto *Salix herbacea* v Centralnih, Južnih in Vzhodnih Alpah, UPGMA, komplement Wishartovega koeficienta podobnosti

**Figure 4:** Dendrogram of alpine snow-bed communities with dominant *Salix herbacea* from Central, Southern and Eastern Alps, UPGMA, complement of Jaccard's index

**Slika 4:** Dendrogram alpskih združb snežnih dolinic s prevladujočo vrsto *Salix herbacea* v Centralnih, Južnih in Vzhodnih Alpah, UPGMA, komplement Jaccardovega indeksa podobnosti

Hierarchical classification based on species constancy demonstrated that the relevés from the Julian Alps are the most similar to the relevés from the Central Alps. If we take into account only the presence and absence of species, our relevés are the most similar to the relevés of the dwarf willow community from the Dolomites. However, floristic similarity is low, less than 30% according to Jaccard and 43% according to Sørensen (1948). Floristic similarity with the stands of the association *Salicetum herbaceae* from the Central Alps is even lower, less than 25% according to Jaccard. Although they share several species (*Salix retusa*, *Silene acaulis*), the communities with *Salix herbacea* from the Southern and Eastern Alps, which are distributed in the mountains with predominantly limestone bedrock, are floristically very different from the studied community from the Julian Alps, which means that our relevés cannot be classified either into the association *Salici herbaceae-Arabidetum caeruleae* or into similar snow-bed communities on limestone bedrock. Two interesting snow-bed communities have been described in the southeastern part of the Italian Alps (Venetian Prealps, Vette di Feltre). One of them was classified into the association *Potentillo dubiae-Homogynetum discoloris* Aichinger 1933, but without *Homogyne discolor* (Giovagnoli & Tasinazzo

2004: 101–103), another into the subassociation *Salicetum herbaceae potentilletosum brauneanae* (Tomaselli et al. 2005: 126–127). The dominant vascular plant species are *Salix herbacea*, *Salix retusa* and *S. reticulata* in the first community and *Salix herbacea*, *Luzula alpinopilosa* and *Leontodon hispidus* in the second (with *Salix retusa* in one of five relevés). However, floristic similarity with the researched community in the Julian Alps is low, with Sørensen index only 34% with *Potentillo dubiae-Homogynetum discoloris* and 40% with *Salicetum herbaceae potentilletosum brauneanae*.

The analysis of the synoptic table (Table 2) shows certain floristic specifics of the stands of the association *Salicetum herbaceae* s. lat. from the Julian Alps. These mainly include moss species *Kiaeria falcata*, *Pohlia obtusifolia*, *Scapania helvetica*, *Sciuro-hypnum starkei*, *Barbilophozia lycopodioides*, *Bartramia ithyphylla*, which are either very rare in the compared communities or were not recorded at all. However, given that mosses were largely ignored in past publications we cannot exclude the possibility that some of these species occur also in the compared communities. E. Pignatti & S. Pignatti (2016: Association Table 12.3), for example, listed only *Polytrichum alpinum*, *Polytrichum* sp. and undetermined mosses with an important cover value in their table.

*Salix retusa* occurs in the relevés from the Julian Alps, the Dolomites and the Eastern Alps. Our relevés comprise a few more species of the class *Juncetea trifidi* and some of them (*Juncus jacquinii*, *Geum montanum* and *Euphrasia pulchella*) were not recorded in the compared communities. Differential for the studied stands from the Julian Alps is *Homogyne discolor*, an eastern Alpine-Illyrian species of subalpine-alpine grasslands on calcareous bedrock.

The analysis of proportions of diagnostic species (Table 3) indicates that the relevés of the community from the Julian Alps have comparatively the highest proportion of the species of the class *Juncetea trifidi* and a very small proportion of species of the class *Thlaspietea rotundifolii*. Compared to the community from the Central Alps this community comprises a higher proportion of species from the class *Elyno-Seslerietea* and a smaller proportion of species of the class *Salicetea herbaceae* and order *Androsacetalia alpinae*. Compared to the Dolomite community the stands of the community from the Julian Alps comprise a higher proportion of species of the class *Salicetea herbaceae* and a substantially lower proportion of species of the order *Arabidetalia caeruleae*. Compared to the communities from the Eastern Alps the studied community comprises a substantially smaller proportion of scree species of the order *Arabidetalia caeruleae* and class *Thlaspietea rotundifolii* and a substantially higher proportion of species of the class *Salicetea herbaceae*.

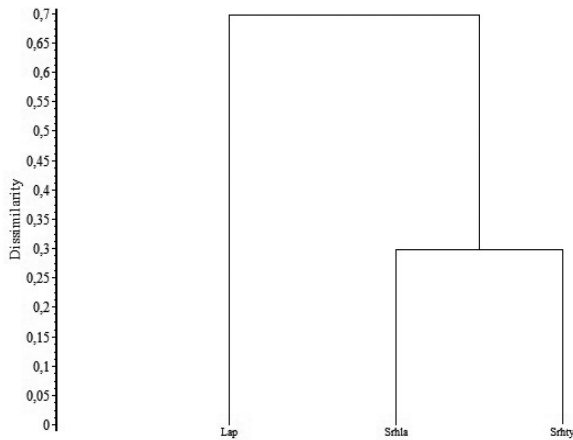
The studied stands could be classified into the new geographical variant *Salicetum herbaceae* Rübel 1911 var. geogr. *Homogyne discolor*. However, the applicable Code of Phytosociological Nomenclature (Weber et al. 2000) does not employ the syntaxonomic rank of geographical variant nor does the new Code that is currently underway (Čarni, in litt.). Low floristic similarity between our relevés and relevés of the association *Salicetum herbaceae* from the Central Alps, the fact that *Salix retusa* occurs in most of our relevés and in some of them even with considerable medium cover, as well as comparison of groups of diagnostic species (Table 3) allow for a description of the new association *Salicetum retuso-herbaceae*. Its diagnostic species (character and differential species) are *Salix herbacea*, *Salix retusa*, *Agrostis rupestris*, *Juncus jacquinii*, *Kiaeria falcata*, *Pohlia obtusifolia* and *Homogyne discolor*. The new association is classified into the alliance *Salicion herbaceae*, order *Salicetalia herbaceae* and class *Salicetea herbaceae*. It could also be classified into the alliance *Salici herbaceae-Arabadion caeruleae*, but our relevés comprise only six of the species that English (1999: 171) designated as diagnostic for this alliance, of which two flowering plants –

*Potentilla brauneana* and *Alchemilla fissa* occur with only a low frequency (in Table 1 they are presented together with the character species of the order *Arabidetalia caeruleae*). Three mosses occur with a higher frequency: *Polytrichum juniperinum*, *Sanonia uncinata* and *Oncophorus virens*. The ecological optimum of *Polytrichum juniperinum* and *Sanonia uncinata* is in the montane belt and higher, but they are distributed in the larger part of Slovenia, including the hill belt. *Oncophorus virens* commonly occurs at the elevations of 1,200 m and higher. It is the most frequent in the subalpine and alpine belts, but occurs in very diverse communities. We believe these three moss species are not relevant character species of a special group of alpine snow-bed communities, so they are presented in Table 1 with other moss species that were not determined in terms of phytosociology.

In terms of diagnostic species of the new association we can ascertain certain similarity with the association *Homogyne discoloris-Salicetum retusae*, but a comparison with the stands of this association in the Southeastern Alps (Aichinger 1933, Haderlapp 1982, Surina 2005) demonstrates distinct differences. The species that differentiate the association *Salicetum retuso-herbaceae* against the association *Homogyne discoloris-Salicetum retusae* are diagnostic species of classes *Salicetea herbaceae* and *Juncetea trifidi*, in particular *Salix herbacea*, *Luzula alpinopilosa*, *Gnaphalium supinum*, *Agrostis rupestris* and *Juncus jacquinii* as well as several moss species.

### 3.2.3 Division into lower syntaxonomic units

The dendrogram in Figure 2 also shows the division into lower syntaxonomic units. For the time being they are described only at the rank of variants due to a lack of relevant differential species to describe subassociations. Relevés 1–15 in Table 1 are treated as the typical variant (var. *typica*). Relevés 16–23 are classified into the variant *Luzula alpinopilosa*. These are the relevés in which this species, which occurs in most of the relevés, has the highest medium cover. Nevertheless, these stands cannot be classified into the association *Luzuletum alpinopilosae* s. lat. (*Luzuletum spadiceae* s. lat.). We compared the stands of the association *Luzuletum alpinopilosae* s. lat. from the Julian Alps (Dakskobler & Poldini 2019), with the stands of the typical variant *Salicetum retuso-herbaceae* var. *typica* and the stands of the variant *Salicetum retuso-herbaceae* var. *Luzula alpinopilosa*, and obtained the result shown in Figure 5, which clearly demonstrates the affinity of these relevés with the association *Salicetum retuso-herbaceae*.



Legend/Legenda

- Lap *Luzuletum alpinopilosae* s. lat., 15 relevés of I. Dakskobler and T. Wraber (Dakskobler & Poldini 2019)
- Srhla *Salicetum retuso-herbaceae* var. *Luzula alpinopilosa*, this article, relevés 16–23 in Table 1
- Srhty *Salicetum retuso-herbaceae* var. *typica*, this article, table 1, relevés 1–15

Figure 5: Dendrogram of communities with dominant *Salix herbacea* and (or) *Luzula alpinopilosa* in the Julian Alps, UPGMA, complement of similarity ratio

Slika 5: Dendrogram združb z dominantnima vrstama *Salix herbacea* in (ali) *Luzula alpinopilosa* v Julijskih Alpah, UPGMA, komplement Wishartovega koeficienta podobnosti

Relevés 24–28 in Table 1 are classified into the variant *Salicetum retuso-herbaceae* var. *Gnaphalium supinum*. The diagnostic species of the association *Salicetum retuso-herbaceae* are very rare here and these stands and their floristic composition resemble also the stands of the association *Nardo-Gnaphalietum supini*. The diagnostic species of this association are *Gnaphalium supinum*, *Nardus stricta*, *Anthoxanthum nipponicum*, *Campanula scheuchzeri*, *Leontodon helveticus* and *Phleum rhaeticum* (English 1993: 395). Our relevés mainly comprise only the first two species and due to their considerable similarity with other forms of the association *Salicetum retuso-herbaceae* (Figure 2 and Table 1) we provisionally decided to classify them into this association as a special variant. Its differential species are *Gnaphalium supinum* and *Crepis aurea*.

Relevés 29, 30 and 31 in Table 1 are tentatively treated as the syntaxon *Salicetum retuso-herbaceae* var. *Nardus stricta*, with relevés 29 and 30 bearing slight resemblance to the stands of the association *Sieversio-Nardetum*. Slightly similar to these three relevés is also relevé 32. Their shared characteristic is the absence of *Luzula al-*

*pinopilosa*. Character species of the association are well represented in relevés 33 to 37, but because of certain floristic specifics these stands could be discussed only at the rank of association (*sensu lato*). Relevés 38–41, on the other hand, are more initial and indicate a higher similarity with the stands of the association *Homogyno discoloris-Salicetum retusae*. *Gnaphalium supinum* and *Homogyno discolor* do not occur there and *Luzula alpinopilosa* is very rare. These relevés are tentatively classified into the variant with *Salix retusa*. Diagnostic species of the association *Salicetum retuso-herbaceae* are almost completely absent from relevés 42–45, but only two of them – relevés 43 and 44 – can be classified into the association *Polytrichetum sexangulare*, whereas relevé 42 with a substantially higher number of flowering plants already indicates the initial form of the association *Salicetum retuso-herbaceae*. Relevé 45 is tentatively classified as a community with dominant *Gnaphalium supinum* (*Gnaphalium supinum* community). Relevé 46 is a community of alpine spring areas and classified into the provisional association *Salici herbaceae-Eriophoretum scheuchzeri* nom. prov. (*Salix herbacea-Eriophorum scheuchzeri* community), because its species composition does not allow it to be classified into the association *Eriophoretum scheuchzeri* Rübél 1911 (Steiner 1993: 144–145).

### 3.3 Review of the studied syntaxa, including the type of newly described community

- Scheuchzerio palustris-Caricetea fuscae* Tx. 1937
- Caricetalia fuscae* Koch 1926
- Caricion fuscae* Koch 1926 nom. conserv. propos.
- Salici herbaceae-Eriophoretum scheuchzeri* nom. prov.
- Salicetea herbaceae* Br.-Bl. 1948
- Salicetalia herbaceae* Br.-Bl. in Br.-Bl. et Jenny 1926
- Salicion herbaceae* Br.-Bl. in Br.-Bl. et Jenny 1926
- Salicetum retuso-herbaceae* ass. nov. hoc loco; the nomenclatural type, *holotypus*, is relevé 14 in Table 1.
- Polytrichetum sexangulare* Frey 1922
- Gnaphalium supinum* community nom. prov.

## 4. Conclusions

Snow-bed communities with dominating *Salix herbacea* are very rare in the Julian Alps, which is largely associated with the predominantly calcareous bedrock. As a rule, they occur on small areas, mainly where the calcareous bedrock is interlayered with marlstone, claystone or chert and where the configuration of the terrain, long-lasting

snow cover and soil conditions allow for the development of characteristic species of snow-bed communities on silicate bedrock, namely dwarf willow and *Luzula alpinopilosa*, *Gnaphalium supinum*, *Soldanella pusilla*, *Sibbaldia procumbens*, characteristic mosses (*Bryopsida*) and liverworts (*Marchantiophyta*): *Anthelia juratzkana*, *Polytrichastrum sexangulare*, *Kiaeria falcata*, *Poblia obtusifolia* and *Scapania helvetica*. In the studied stands, especially those made under Mt. Mangart and on Mt. Plešivec in the Loška Stena rock wall, these character species of snow beds are accompanied also by character species of acidophilous alpine grasslands from the class *Juncetea trifidi* (*Agrostis rupestris*, *Juncus jacquini*, *Potentilla aurea*, *Leontodon helveticus*, in places also *Nardus stricta*). Soil reaction in the studied communities is always acid (pH 4.1–5.6). The species that are abundant and characteristic on nival soils on fine calcareous gravel are less frequent, with the exception of *Salix retusa*, *Veronica alpina* (which some authors classify among the character species of the class *Salicetea herbaceae*) and *Taraxacum* sect. *Alpina*. The only frequent species of subalpine-alpine grasslands, other than the widely distributed *Polygonum viviparum*, is *Homogyne discolor*, while *Poa alpina* and (partly) *Crepis aurea* are frequent among the species of nutrient-rich altimontane-subalpine grasslands and pastures. The full species composition of the recorded dwarf willow stands in the Julian Alps allows for their classification into the association *Salicetum herbaceae* at the rank of a new geographical variant with *Homogyne discolor*, but its full floristic inventory is nevertheless very different from the floristic inventory of this community in the Central and Eastern Alps and the Dolomites, which means that classification into the new association *Salicetum retuso-herbaceae* is also correct as it indirectly indicates the contact and affinity with snow-bed communities on calcareous gravel. The stands of the new association are extremely important as biotopes as they are sites of several Red-listed flowering and vascular plants (Anon. 2002, Annex 1): *Astragalus australis*, *Coeloglossum viride*, *Eriophorum scheuchzeri*, *Elyna myosuroides*, *Helictotrichon versicolor*, *Juncus trifidus*, *Luzula alpinopilosa*, *Sedum alpestre*, and especially mosses and liverworts (Anon. 2002, Annex 2): *Anthelia juratzkana*, *Asterella lindenberghiana*, *Kiaeria starkei*, *Poblia drummondii*, *Poblia obtusifolia*, *Polytrichastrum sexangulare*, *Scapania helvetica*, *Sciuro-hypnum glaciale* and *Tortula mucronifolia*. Vegetation of snow beds with *Salix herbaceae* under Mt. Mangart is indirectly threatened by grazing by small ruminants and (too) many tourists that visit the area in the summer; it is less threatened on Mt. Plešivec in Loška Stena and in the cirque Na Jezerih under the peaks of Rokavi.

## 5. Povzetek

### Združbe snežnih dolinic s prevladujočo vrsto *Salix herbacea* v Julijskih Alpah

Združbe snežnih tal oz. snežnih dolinic so v slovenskih Alpah vezane na območja, kjer sneg dolgo obleži in jih dolgo namaka snežnica (tla so dobro namočena s talečim se snegom). Najbolj značilne združbe v pravih snežnih dolinicah (razred *Salicetea herbaceae*) so razširjene samo v drobcih, tako združba norveškega lasastega kapičarja (*Polytrichetum sexangulare* = *Polytrichetum norvegicae*) in zelnate vrbe (*Salicetum herbaceae* s. lat.). Bolj razširjeni so sestoji več drugih ledeniških vrb in rastlin snežnih melišč (zveza *Arabidion caeruleae*). Združbo zelnate vrbe oz. njene sestoje poznamo pod Mangartom, v Škrlatiški skupini, na Kriških podih in na Stolu v Karavankah. Podrobno fitocenološko-ekološko raziskavo njenih sestojev v Julijskih Alpah sta opravila pokojni Tone Wraber (1938–2010) in Andrej Martinčič v začetku septembra 1968 v Škrlatiški skupini, v krnici Na jezerih (Na jezeru) pod Visokim Rokavom in dve leti kasneje, začetek septembra 1970, pod Mangartom (na Mangartskem sedlu, v kotanji Prodi). Njuni popisi so bili podlaga za fitocenološko analizo s hierarhično klasifikacijo in uvrstitev preučeni združb v sintaksonomski sistem. Na podlagi primerjav s podobnimi združbami drugod v Centralnih, Južnih in Vzhodnih Alpah lahko večino preučeni sestojev vrednotimo kot novo geografsko varianto *Salicetum herbaceae* var. *Homogyne discolor* ali kot novo asociacijo *Salicetum retuso-herbaceae*. Ker Kodeks fitocenološke nomenklature ranga geografske variante ne obravnava in ker primerjave (tabele 2 in 3) potrjujejo zadostne floristične razlike, smo se odločili za opis nove asociacije. Njene diagnostične vrste (značilnice in razlikovalnice) so *Salix herbacea*, *Salix retusa*, *Agrostis rupestris*, *Juncus jacquini*, *Kiaeria falcata*, *Poblia obtusifolia* in *Homogyne discolor*. Novo asociacijo uvrščamo v zvezo *Salicion herbaceae*, red *Salicetalia herbaceae* in razred *Salicetea herbaceae*. Razlikujemo več variant (var. *typica*, var. *Luzula alpinopilosa*, var. *Gnaphalium supinum*, var. *Nardus stricta* in var. *Salix retusa*), ki označujejo različne razvojne stopnje rastja snežnih tal na mešani karbonatno-silikatni podlagi v alpskem pasu, kjer pa je reakcija tal vedno kislja (pH 4,1–5,6). Le dva popisa s krnice Na jezerih lahko uvrstimo v najbolj pionirsko obliko, asociacijo *Polytrichetum sexangulare*, en popis s Prodiv pod Mangartom pa v združbo alpskega povirja *Salici herbaceae-Eriophoretum scheuchzeri* nom. prov. Združbe zelnate vrbe v Julijskih Alpah so z biotopskega vidika zelo pomembne, saj so rastišče nekaterih vrst iz rdečega seznama cvetnic in praprotnic (Anon. 2002,



Priloga 1): *Astragalus australis*, *Coeloglossum viride*, *Eriophorum scheuchzeri*, *Elyna myosuroides*, *Helictotrichon versicolor*, *Juncus trifidus*, *Luzula alpinopilosa*, *Sedum alpestre*, še posebej pa mahov in jetrenjakov (Anon. 2002, Priloga 2): *Anthellia juratzkana*, *Asterella lindenberghiana*, *Kiaeria starkei*, *Pohlia drummondii*, *Pohlia obtusifolia*, *Polytrichastrum sexangulare*, *Scapania helvetica*, *Sciuro-hypnum glaciale* in *Tortula mucronifolia*. Vegetacija snežnih dolinic z vrsto *Salix herbaceae* pod Mangartom posredno ogroža paša drobnice in predvsem (pre)velik turistični obisk v poletnem času, manj ogrožena je na Plešivcu v Loški steni in v krnici Na jezerih pod Rokavi.

## 6. Acknowledgements

We would like to thank the heirs of late Tone Wraber for giving his manuscripts and professional literature to the safekeeping of the Botanical Garden of the University of Ljubljana, and to its director, Dr. Jože Bavcon, who allowed us to examine professor's legacy. We owe special thanks to Dr. Branko Vreš, Mag. Andrej Seliškar and Brane Anderle, co-authors of Figure 1. Two anonymous reviewers helped us with valuable improvements and corrections. We also acknowledge the financial support from the Slovenian Research Agency (research core funding No. P1-0236). English translation by Andreja Šalamon Verbič.

## 7. References

- Aeschmann, D., Lauber, K., Moser, D. M. & Theurillat, J.-P. 2004: Flora alpina. Bd. 1, 2, 3. Haupt Verlag, Bern, Stuttgart, Wien, 1159 pp., 1188 pp., 322 pp.
- Aichinger, E. 1933: Vegetationskunde der Karawanken. Gustav Fischer Verlag, Jena, 329 pp.
- Anonymous 2002: Pravilnik o uvrstitvi ogroženih rastlinskih in živalskih vrst v rdeči seznam. Uradni list RS 82/2002.
- Braun-Blanquet, J. 1964: Pflanzensoziologie. Grundzüge der Vegetationskunde. 3. Auflage. Springer, Wien – New York, 865 pp.
- Braun-Blanquet, J. & Jenny, J. 1926: Vegetationsentwicklung und Bodenbildung in der alpinen Stufe der Zentralalpen. Denkschr. Schweiz. Naturforsch. Ges. Zürich 63: 183–349.
- Buser, S. 2009: Geološka karta Slovenije 1: 250.000. Geological map of Slovenia 1: 250.000. Geološki zavod Slovenije, Ljubljana.
- Cegnar, T. 1998: Temperatura zraka. In: Fridl, J., Kladnik, D., Orožen Adamič, M. & Perko, D. (eds.): Geografski atlas Slovenije. Država v prostoru in času. Državna založba Slovenije, Ljubljana, pp. 100–101.
- Dakskobler, I. & Poldini, L. 2019: Alpine grasslands with dominant *Luzula alpinopilosa* in the Julian and Carnic Alps (NW Slovenia, NE Italy). Hacquetia – in review.
- Eggensberger, P. 1994: Die Pflanzengesellschaften der subalpinen und alpinen Stufe der Ammergauer Alpen und ihre Stellung in den Ostalpen. Ber. Bayer. Bot. Ges., Beihefte 8: 3–239.
- Englich, T. 1993: *Salicetea herbaceae*. In: Mucina, L., Grabherr, G. & Ellmauer, T. (eds.): Die Pflanzengesellschaften Österreichs. Teil II. Gustav Fischer Verlag, Jena. pp. 389–399.
- Englich, T. 1999: Multivariate Analysen zur Synsystematik und Standortsökologie der Schneebodenvegetation (*Arabidetalia caeruleae*) in den Nördlichen Kalkalpen. Stapfia 59, 211 pp. + Tables.
- Giovagnoli, L. & Tasinazzo, S. 2014: The dolina system vegetation of the northern glacio-karst sector of the Asiago Plateau (Venetian Prealps – NE Italy). Plant Sociology 51 (2): 83–116.
- Grabherr, G. & Mucina, L. (eds.) 1993: Die Pflanzengesellschaften Österreichs. Teil II: Natürliche waldfreie Vegetation. Gustav Fischer Verlag, Jena - Stuttgart - New York. 523 pp.
- Haderlapp, P. 1982: Alpine Vegetation Der Steiner Alpen. Carinthia II 40: 3–56.
- Hegi, G., Merxmüller, H. Reisigl, H. 1980: Alpska flora. Prevedel in dopolnil T. Wraber. Državna založba Slovenije, Ljubljana, 223 pp.
- Maarel van der, E. 1979: Transformation of cover-abundance values in phytosociology and its effects on community similarity. Vegetatio 39 (2): 97–114.
- Martinčič, A., Wraber, T., Jogan, N., Podobnik, A., Turk, B., Vreš, B., Ravnik, V., Frajman, B., Strgulc Krajšek, S., Trčak, B., Bačič, T., Fischer, M. A., Eler, K. & Surina, B. 2007: Mala flora Slovenije. Ključ za določanje praprotnic in semenk. Četrta, dopolnjena in spremenjena izdaja. Tehniška založba Slovenije, Ljubljana, 967 pp.
- Mucina, L., Bültmann, H., Dierßen, K., Theurillat, J.-P., Raus, T., Čarni, A., Šumberová, K., Willner, W., Dengler, J., Gavilán García, R., Chytrý, M., Hájek, M., Di Pietro, R., Iakushenko, D., Pallas, J., Daniěls, F. J. A., Bergmeier, E., Santos Guerra, A., Ermakov, N., Valachovič, M., Schaminée, J. H. J., Lysenko, T., Didukh, Y. P., Pignatti, S., Rodwell, J. S., Capelo, J., Weber, H. E., Solomeshch, A., Dimopoulos, P., Aguiar, C., Hennekens, S. M. & Tichý, L. 2016: Vegetation of Europe: hierarchical floristic classification system of vascular plant, bryophyte, lichen, and algal communities. Applied Vegetation Science 19, Supplement 1: 3–264.
- Oberdorfer E. 1992: Klasse *Salicetea herbaceae* Br.-Bl. et al. 47. In: Oberdorfer E. (ed.): Süddeutsche Pflanzengesellschaften, 3. Aufl. Teil 1, Gustav Fischer Verlag, Jena. pp. 214–220.
- Pignatti, E. & Pignatti, S. 2014: Plant Life of the Dolomites. Vegetation Structure and Ecology. Publication of the Museum of Nature South Tyrol Nr. 8, Naturmuseum Südtirol, Bozen, Springer Verlag, Heidelberg, 769 pp.
- Pignatti, E. & Pignatti, S. 2016: Plant Life of the Dolomites. Vegetation Tables. Publication of the Museum of Nature South Tyrol Nr. 11, Bozen, Springer Verlag, Heidelberg, 575 pp.
- Podani, J. 2001: SYN-TAX 2000. Computer Programs for Data Analysis in Ecology and Systematics. User's Manual, Budapest, 53 pp.
- Ros, R.M., Mazimpaka, V., Abou-Salama, U., Aleffi, M., Blockeel, T.L., Brugués, M., Cano, M.J., Cros, R.M., Dia, M.G., Dirkse, G.M., El Saadawi, W., Erdag, A., Ganeva, A., González-Mancebo, J.M., Hernstadt, I., Khalil, K., Kürschner, H., Lanfranco, E., Losada-Lima, A., Refai, M.S., Rodríguez-Núñez, S., Sabovljević, M., Sérgio, C., Shabbara, H., Sim-Sim, M. & Söderström, M. 2007: Hepatics

and Anthocerotales of the Mediterranean, an annotated checklist. *Cryptogamie, Bryologie* 28 (4): 351–437.

Ros, R.M., Mazimpaka, V., Abou-Salama, U., Aleffi, M., Blockeel, T.L., Brugués, M., Cros, R.M., Dia, M.G., Dirkse, G.M., Draper, I., El Saadawi, W., Erdağ, A., Ganeva, A., Gabriel, R., González-Mancebo, J.M., Hernstadt, I., Hugonnot, V., Khalil, K., Kürschner, H., Losada-Lima, A., Luís, L., Mifsud, S., Privitera, M., Puglisi, M., Sabovljević, M., Sérgio, C., Shabbara, H.M., Sim-Sim, M., Sotiaux, A., Tacchi, R., Vanderpoorten, A. & Werner, O. 2013: Mosses of the Mediterranean, an annotated checklist. *Cryptogamie, Bryologie* 34 (2): 99–283.

Seliškar, T., Vreš, B. & Seliškar, A. 2003: FloVegSi 2.0. Računalniški program za urejanje in analizo bioloških podatkov. Biološki inštitut ZRC SAZU, Ljubljana.

Sørensen, Th. 1948: A method of establishing groups of equal amplitude in plant sociology based on similarity of species content. *Det Kongelige Danske Videnskaberne Selskab, Biologiske Skrifter* 5 (4): 1–34.

Steiner, G. M. 1993: *Scheuchzeria-Caricetea fuscae*. In: G. Grabherr & L. Mucina (eds.): Die Pflanzengesellschaften Österreichs. Teil II: Natürliche waldfreie Vegetation. Gustav Fischer Verlag, Jena - Stuttgart - New York, pp. 131–165.

Suppan, U., Prügger, J. & Mayrhofer, H. 2000: Catalogue of the lichenized and lichenicolous fungi of Slovenia. *Bibliotheca Lichenologica* 76: 1–215.

Surina, B. 2005: Subalpina in alpinska vegetacija Krnskega pogorja v Julijskih Alpah. *Scopolia* 57: 1–122.

Šilc, U. & Čarni, A. 2012: Conspectus of vegetation syntaxa in Slovenia. *Hacquetia* 11 (1): 113–164.

Theurillat, J.-P. 2004: Pflanzensociologisches System. In: Aeschmann, D., Lauber, K., Moser, D. M. & Theurillat, J.-P.: *Flora alpina*, 3. Haupt Verlag, Bern, Stuttgart, Wien, pp. 301–313.

Tomaselli, M., Petraglia, A., Lasen, C. 2005: Flora briologica e vegetazione delle vallette nivali nelle Vette di Feltre (Parco nazionale Dolomiti Bellunesi, Italia settentrionale). *Gortania* 26 (2004): 111–136.

Vidic, N. J., Prus, T., Grčman, H., Zupan, M., Lisec, A., Kralj, T., Vrščaj, B., Ruprecht, J., Šporar, M., Suhadolc, M., Mihelič, R. & Lobnik, F. 2015: Tla Slovenije s pedološko karto v merilu 1: 250 000. Soils of Slovenia with soil map 1: 250 000. European Union & University of Ljubljana, Luxembourg, Ljubljana, 152 pp. + maps.

Vrščaj, B., Repe, B., Simončič, P. 2017: *The Soils of Slovenia*. Springer, Dordrecht, 216 pp.

Weber, H. E., J. Moravec, J. P. Theurillat 2000: International Code of Phytosociological Nomenclature. 3rd. Edition. *Journal of Vegetation Science* 11 (5): 739–766.

Wirth, V. 1995: *Flechtenflora*. 2. Auf. Verlag Eugen Ulmer, Stuttgart, 661 pp.

Wraber, T. 1972: Contributo alla conoscenza della vegetazione pioniere (*Asplenietea rupestris* e *Thlaspeetea rotundifolia*) delle Alpi Giulie. Tesi di laurea. Università degli Studi di Trieste, Facoltà di Scienze, Trieste. 81 pp.

Wraber, T. 1996a: Združbe skalnih razpok, melišč, rečnih prodišč, snežnih dolinic, visokogorskih resav in travišč. In: Gregori, J. et al. (eds.): *Narava Slovenije, stanje in perspektive*: Zbornik prispevkov o naravnih dediščini Slovenije. Društvo ekologov Slovenije, Ljubljana. pp. 107–112.

Wraber, T. 1996b: Rastlinstvo. *Enciklopedija Slovenije* 10 (Pt-Savn), str. 85–93, Mladinska knjiga, Ljubljana.

Zupančič, B. 1998: Padavine. In: Fridl, J., Kladnik, D., Orožen Adamič, M. & Perko, D. (eds.): *Geografski atlas Slovenije*. Država v prostoru in času. Državna založba Slovenije, Ljubljana, pp. 98–99.



**Figure 6:** Snow-bed vegetation with *Eriophorum scheuchzeri* and *Salix herbacea*, Prodi below Mt. Mangart. Photo: I. Dakskobler.  
**Slika 6:** Rastje snežnih dolinic z vrstama *Eriophorum scheuchzeri* in *Salix herbacea*, Prodi pod Mangartom. Foto: I. Dakskobler.



**Figure 7:** Stand of the association *Salicetum retuso-herbaceae*, Na Jezerih below Mt. Visoki Rokav. Photo: I. Dakskobler.  
**Slika 7:** Sestoj asociacije *Salicetum retuso-herbaceae*, Na jezerih pod Visokim Rokavom. Foto: I. Dakskobler.

**Table 1:** Snow-bed communities with *Salix herbacea* in the Julian Alps

**Tabela 1:** Združbe snežnih dolinic z vrsto *Salix herbacea* v Julijskih Alpah

Number of relevé (Zaporedna številka popisa)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Database number of relevé (Delovna številka popisa)	253942	270543	270544	270578	270542	270559	270567	270545	270549	270550	270547	270548	270552	270575	270579	270539	
Acronym of syntaxa (Akronim za sintaksone)	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	Srhty	
Author of the relevé (Avtor popisa)	ID	TWAM	TWAM	TWAM	TWAM	TWAM	TWAM	TWAM	TWAM	TWAM	TWAM	TWAM	TWAM	TWAM	TWAM	hTWAM	
Elevation in m (Nadmorska višina v m)	2125	2100	2100	2000	2080	2100	1950	2100	2100	2100	2100	2100	2100	1950	2000	2084	
Aspect (Lega)	N	N	N	E	N	N	E	N	N	N	N	N	N	N	S	N	
Slope in degrees (Nagib v stopinjah)	10	5	5	3	15	10	4	10	5	2	5	5	15	2	15	20	
Parent material (Matična podlaga)	ALR	ALR	ALR	Gr	ALR	ALR	Gr	ALR	ALR	ALR	ALR	ALR	ALR	Gr	ALR	Gr	
Soil (Tla)	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	
Stoniness in % (Kamnitost v %)	.	.	.	5	.	.	.	.	.	.	.	.	10	20	.	.	
Cover of herb layer in % (Zastiranje zeliščne plasti v %): E1	80	100	100	95	100	100	100	80	80	70	80	80	50	50	50	100	
Cover of moss layer in % (Zastiranje mahovne plasti v %): E0	20	15	20	15	10	50	10	20	70	70	50	50	50	30	50	10	
Number of species (Število vrst)	30	30	27	23	24	16	22	27	22	21	27	22	24	25	25	26	
Relevé area (Velikost popisne ploskve) m <sup>2</sup>	10	1,5	1,5	2	1	2	1	1	1	1	1	1	2	2	2	2	
Date of taking relevé (Datum popisa)	8/6/2014	9/2/1970	9/2/1970	9/3/1970	9/3/1970	9/2/1970	9/3/1970	9/2/1970	9/2/1970	9/2/1970	9/2/1970	9/2/1970	9/2/1970	9/3/1970	9/3/1970	9/3/1970	
Locality (Nahajališče)	Mangartsko sedlo	Mangartsko sedlo	Mangartsko sedlo	Mangart-Rdeča glava	Mangartsko sedlo	Mangartsko sedlo	Mangart-Prodi	Mangartsko sedlo	Mangartsko sedlo	Mangartsko sedlo	Mangartsko sedlo	Mangartsko sedlo	Mangartsko sedlo	Mangart-Prodi	Mangartsko sedlo	Mangartsko sedlo	
Quadrant (Kvadrant)	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	9547/4	
Coordinate GK Y (D-48) m	396455	396400	396412	396015	396474	396454	396315	396436	396450	396471	396435	396439	396469	396358	396189	396465	
Coordinate GK X (D-48) m	5145562	5145536	5145546	5145130	5145579	5145567	5145024	5145542	5145566	5145567	5145556	5145562	5145570	5145096	5145156	5145556	
<b>Diagnostic species of the association (Diagnostične vrste asociacije)</b>																	
SH <i>Salix herbacea</i>	E1	3	2	1	2	4	5	2	1	1	1	1	1	3	2	.	1
AC <i>Salix retusa</i>	E1	1	+	2	2	1	+	.	2	2	2	2	1	1	+	+	1
JT <i>Agrostis rupestris</i>	E1	+	1	1	1	+	1	+	1	1	1	1	1	1	+	+	+
JT <i>Juncus jacquini</i>	E1	.	+	+	1	+	+	+	1	+	+	1	+	.	+	1	+
SH <i>Kiaeria falcata</i>	E0	1	.	1	.	1	3	1	1	1	1	+	1	1	1	3	+
SH <i>Pohlia obtusifolia</i>	E0	.	+	+	+	1	.	+	.	+	+	+	.	.	+	+	.
ES <i>Homogyne discolor</i>	E1	1	+	.	.	.	.	.	1	1	+	+	.	.	r	.	+

	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	45	46	
5145570	396463	396454	396484	396402	396335	396435	396472	410980	410968	396339	396015	396024	410852	396285	396306	396315	396381	410746	410863	397390	397385	396445	396406	396391	396478	396360	410953	410974	410849	396171	
5145580	270562	270541	270560	270580	270581	270546	270582	270413	270414	270569	270587	270586	270417	270536	270537	270566	270573	270415	270416	269490	269494	270538	270576	270577	270540	270571	270408	270411	270409	270535	
5145573	2100	2080	2100	1950	1950	2100	2150	2170	2170	1950	2000	2000	2175	1950	1950	1950	2220	2200	2190	2190	2084	1950	1950	2080	1950	2170	2170	2200	1950		
5145100	Re	Re	Re	Re	Re	Re	Re	Gl	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	Re	
5145201	2	1	2	2	2	1	20	2	8	1	2	2	6	1	1	1	6	10	4	2	2	1	1	2	1,5	4	3	6	1		
5145556	9/2/1970	9/3/1970	9/2/1970	9/3/1970	9/3/1970	9/2/1970	8/7/1983	9/12/1968	9/12/1968	9/3/1970	9/3/1970	9/3/1970	9/13/1968	9/3/1970	9/3/1970	9/3/1970	9/12/1968	9/13/1968	7/28/2017	7/28/2017	9/3/1970	9/3/1970	9/3/1970	9/3/1970	9/3/1970	9/12/1968	9/12/1968	9/12/1968	9/12/1968	9/3/1970	
5144782	Mangartsko sedlo	Mangartsko sedlo	Mangartsko sedlo	Mangart-Prodi	Mangart-Prodi	Mangartsko sedlo	Mangart-Jarečica	Na Jezerih-Rokavi	Na Jezerih-Rokavi	Mangartsko sedlo	Mangartsko sedlo	Mangartsko sedlo	Na Jezerih-Rokavi	Mangart-Prodi	Mangart-Prodi	Mangart-Prodi	Na Jezerih-Rokavi	Na Jezerih-Rokavi	Loška stena-Plesivec	Loška stena-Plesivec	Mangartsko sedlo	Mangart-Prodi	Mangart-Prodi	Mangart-Prodi	Mangartsko sedlo	Mangart-Prodi	Na Jezerih-Rokavi	Na Jezerih-Rokavi	Na Jezerih-Rokavi	Mangart-Prodi	
5144193	+	+	.	+	2	+	2	2	.	.	.	.	+	2	2	.	5	+	1	3	2	2	2	1	+	.	.	.	2	38	
5144164	+	1	1	+	1	3	4	.	.	+	+	1	.	2	.	.	.	+	2	.	1	1	2	1	4	.	.	.	.	31	
5145052	.	.	+	.	+	.	1	.	.	.	+	.	.	.	.	.	.	.	2	2	1	2	1	1	1	.	.	.	.	34	
5145128	.	.	+	.	.	.	+	.	.	+	+	.	.	.	.	.	.	.	.	2	1	2	1	1	1	.	.	.	.	23	
5144044	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	16
5144988	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	35
5145004	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	21
5145024	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	46
5145084	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15
5144193	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	33

Pr. Fr.  
38 83  
31 67  
34 74  
23 50  
21 46  
16 35  
15 33

Number of relevé (Zaporedna številka popisa)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
<b>Salicetea herbaceae</b>																		
SH	<i>Gnaphalium supinum</i>	E1	1	2	1	.	+	1	3	2	1	1	2	2	1	+	2	+
SH	<i>Soldanella pusilla</i>	E1	+	2	2	+	1	2	+	1	1	+	+	2	r	+	2	2
SH	<i>Luzula alpinopilosa</i>	E1	.	1	1	+	1	+	1	1	1	2	1	2	+	2	1	4
SH	<i>Sibbaldia procumbens</i>	E1	+	r	.	.	+	+	.	+	+	.	.	.	+	+	1	1
SH	<i>Sagina saginoides</i>	E1	.	r	.	.	r	.	.	+	+	+	r	r	.	r	+	.
SH	<i>Anthelia juratzkana</i>	E0	+	1	.	.	+	.	1	2	4	4	3	3	3	2	+	.
SH	<i>Polytrichastrum sexangulare</i>	E0	+	.	+	.	+	.	.	.	r	r	+	r	+	+	1	.
SH	<i>Scapania helvetica</i>	E0	+	1	1	.	.	.	.	2	1	1	.	.	+	.	.	.
SH	<i>Sciuro-hypnum glaciale*</i>	E0	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
SH	<i>Kiaeria starkei</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SH	<i>Pohlia drummondii</i>	E0	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
SH	<i>Asterella lindenbergiana</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
AA	<b>Androsacetalia alpinae</b>																	
	<i>Oxyria digyna</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Sedum alpestre</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
AC	<b>Arabidetalia caeruleae</b>																	
	<i>Veronica alpina</i>	E1	.	.	.	.	r	.	+	.	r	.	.	.	+	.	.	+
	<i>Taraxacum sect. Alpina</i>	E1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+
	<i>Potentilla brauneana</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Saxifraga androsacea</i>	E1	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.
	<i>Carex parviflora</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Alchemilla fissa</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Galium noricum</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Ranunculus traunfellneri</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Rumex nivalis</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Salix reticulata</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Arabis caerulea</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Doronicum glaciale</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Gnaphalium hoppeanum</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Trifolium pallescens</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
TR	<b>Thlaspiion rotundifolii, Thlaspietea rotundifolii</b>																	
	<i>Achillea atrata</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r
	<i>Rhodiola rosea</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Hutchinsia alpina</i> subsp. <i>brevicaulis</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Saxifraga sedoides</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Festuca nitida</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
	<i>Moehringia ciliata</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Sedum atratum</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
LV	<b>Loiseleurio-Vaccinietea</b>																	
	<i>Vaccinium gaulttherioides</i>	E1	+	1	.	2	.	.	.	.	.	.	.	.	.	.	.	.
NS	<b>Nardion strictae</b>																	
	<i>Nardus stricta</i>	E1	+	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.
	<i>Coeloglossum viride</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Alchemilla flabellata</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
JT	<b>Juncetea trifidi</b>																	
	<i>Potentilla aurea</i>	E1	1	1	1	1	.	.	+	+	1	.	2	+	.	+	1	+
	<i>Leontodon helveticus</i>	E1	1	2	2	1	.	+	.	1	1	+	1	1	r	.	1	.
	<i>Campanula scheuchzeri</i>	E1	.	.	.	+	.	.	.	+	.	r	r	.	.	.	.	1
	<i>Geum montanum</i>	E1	+	r	.	.	.	.	+	.	.	.	.	.	.	.	r	.

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	45	46	Pr.	Fr.	
+	+	+	+	+	+	+	3	3	4	2	3	+	+	+	+	+	1	+	+	.	.	.	.	.	.	r	2	2	.	38	83	
2	+	2	3	2	2	2	2	2	2	2	1	2	2	+	2	+	2	2	1	1	.	+	.	.	.	.	.	.	.	38	83	
5	5	3	2	3	1	2	+	1	2	1	1	.	.	.	.	r	.	2	1	.	.	.	1	+	.	.	.	.	32	70		
+	+	2	+	.	+	+	2	1	1	+	1	.	.	+	3	+	.	+	.	.	.	.	.	.	r	.	+	.	27	59		
+	.	.	r	+	.	.	+	+	+	r	.	+	+	+	1	+	+	.	.	.	.	.	.	+	1	+	1	.	26	57		
.	.	.	+	r	.	2	1	3	+	.	.	.	.	.	.	2	1	.	.	.	.	.	.	2	2	1	+	.	24	52		
.	1	.	2	1	.	.	.	2	1	+	.	.	.	.	.	1	.	+	.	.	.	.	1	2	2	1	.	22	48			
.	+	.	.	.	.	.	.	.	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11	24	
.	.	.	.	.	.	.	(+)	.	.	.	.	.	+	+	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	6	13	
.	.	.	.	+	.	.	.	+	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	4	9	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	3	7	
.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	3	7	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
+	+	.	+	+	.	1	.	1	+	+	+	.	+	+	1	+	r	.	.	.	r	.	.	.	1	.	+	1	1	24	52	
+	+	.	+	+	r	1	.	.	.	.	.	.	r	.	+	+	.	.	.	.	.	.	.	+	.	r	r	+	.	15	33	
.	.	.	.	.	.	.	+	+	+	.	.	.	r	.	.	+	.	.	.	.	.	.	.	.	r	.	1	.	.	7	15	
r	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	6	13	
r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	r	r	+	.	.	.	.	.	.	.	.	.	.	.	5	11	
+	+	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	9	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.	3	7
.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	3	7
.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	2	4	
.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	2	
.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	7
+	.	.	+	+	+	+	.	+	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	r	2	.	12	26	
.	.	.	.	.	r	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	+	.	.	.	.	4	9	
.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	r	.	3	7	
.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	2	4	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	7
.	.	.	+	.	.	.	.	+	+	+	+	5	3	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	13	28	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
+	.	1	1	1	1	+	+	.	.	1	1	1	.	.	+	.	2	2	1	1	+	1	1	.	.	.	.	.	30	65		
+	+	+	.	+	1	r	.	.	.	.	.	+	.	.	r	.	.	4	3	+	.	+	.	.	.	.	.	.	24	52		
1	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	+	1	.	.	+	+	1	1	.	.	.	.	15	33		
+	.	.	.	.	+	.	.	.	+	+	+	.	r	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	12	26		

Number of relevé (Zaporedna številka popisa)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Euphrasia pulchella</i>	E1	1	+	+	+	.	.	r	.	.	.	+	+	.	.	.
	<i>Anthoxanthum nipponicum</i>	E1	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
	<i>Euphrasia minima</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Hieracium alpinum</i>	E1	.	r	r	.	.	.	.	.	.	.	.	.	E1	.	.
	<i>Helictotrichon versicolor</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	E1	.	.
	<i>Juncus trifidus</i>	E1	.	.	.	1	.	.	.	.	.	.	.	.	E1	.	.
OE	<b>Oxytropido-Elynon</b>																
	<i>Salix serpyllifolia</i>	E1	1	.	.	.	.	.	.	.	.	.	.	.	E1	.	.
	<i>Antennaria carpatica</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	E1	.	.
	<i>Carex atrata</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	E1	.	.
	<i>Elyna myosuroides</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	E1	.	.
	<i>Lloydia serotina</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	E1	.	.
CF	<b>Caricion ferrugineae</b>																
	<i>Gentiana pumila</i>	E1	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.
	<i>Cerastium subtriflorum</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	E1	.	.
Cfir	<b>Caricion firmae</b>																
	<i>Silene acaulis</i>	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+
	<i>Minuartia sedoides</i>	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Veronica aphylla</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Carex firma</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Festuca quadriflora</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Saussurea pygmaea</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SV	<b>Seslerietalia coeruleae</b>																
	<i>Potentilla crantzii</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Astragalus australis</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Gentiana orbicularis</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ES	<b>Elyno-Seslerietea</b>																
	<i>Polygonum viviparum</i>	E1	2	1	1	2	+	+	+	1	+	+	1	+	+	1	1
	<i>Euphrasia salisburgensis</i>	E1	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.
	<i>Alchemilla illyrica</i> ( <i>A. colorata</i> )	E1	.	.	.	.	.	.	r	.	.	+	.	.	.	.	.
	<i>Alchemilla exigua</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Bartsia alpina</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+
	<i>Selaginella selaginoides</i>	E1	.	.	r	.	.	.	.	.	.	.	.	.	E1	.	.
	<i>Agrostis alpina</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Gentianella anisodonta</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Thymus praecox</i> subsp. <i>polytrichus</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Carex sempervirens</i>	E1	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Myosotis alpestris</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SCF	<b>Scheuchzerio-Caricetea fuscae</b>																
	<i>Eriophorum scheuchzeri</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Carex capillaris</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
MC	<b>Montio-Cardaminetea</b>																
	<i>Epilobium anagallidifolium</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Saxifraga stellaris</i> subsp. <i>alpigena</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Cratoneuron filicinum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Saxifraga aizoides</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
FB	<b>Festuco-Brometea</b>																
	<i>Carex caryophyllea</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
PaT	<b>Poo alpinae-Trisetetalia</b>																
	<i>Poa alpina</i>	E1	2	+	+	+	+	+	+	+	+	+	+	r	+	+	+



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	45	46	Pr.	Fr.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	1	+	.	.	.	.	.	.	10	22
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	3	7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	2	4
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	3	7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	2
.	.	.	.	.	.	+	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	r	.	+	8	17
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	2
.	.	.	.	.	.	+	2	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	r	10	22
.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	1	+	.	+	+	.	.	.	+	.	.	.	.	.	8	17
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	4	9
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
2	+	1	1	2	1	3	1	+	.	+	.	+	+	1	+	.	2	1	2	.	1	2	2	1	.	.	r	+	39	85	
.	.	.	.	.	.	.	+	+	.	.	.	+	.	.	.	.	1	1	.	.	.	.	.	+	.	.	.	.	+	9	20
.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	r	+	.	.	.	.	.	7	15
.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	r	r	.	5	11
.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	4	9
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	+	.	.	.	.	.	4	9
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	2	.	.	.	.	.	3	7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	r	3	7
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	2	4
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
1	+	+	+	+	+	1	2	2	+	+	+	1	+	+	1	1	2	2	.	1	+	+	+	+	1	1	1	3	44	96	

Number of relevé (Zaporedna številka popisa)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	<i>Crepis aurea</i>	E1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	
	<i>Poa supina</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
	<i>Phleum rhaeticum</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
	<i>Trollius europaeus</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
	<i>Deschampsia cespitosa</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
MuA	<b>Mulgedio-Aconitetea</b>																	
	<i>Peucedanum ostruthium</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
	<i>Viola biflora</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
VP	<b>Vaccinio-Piceetea</b>																	
	<i>Homogyne alpina</i>	E1	.	+	.	.	.	.	.	.	.	r	.	.	.	+	.	
	<i>Hylocomium splendens</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
	<i>Vaccinium myrtillus</i>	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
	<i>Polytrichum formosum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
	<i>Pleurozium schreberi</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
O	<b>Other species (Druge vrste)</b>																	
	<i>Epilobium</i> sp.	E1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
	<i>Leontodon</i> sp.	E1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
ML	<b>Mosses and lichens (Mahovi in lišaji)</b>																	
	<i>Polytrichum juniperinum</i>	E0	1	1	1	1	+	r	+	.	1	1	1	.	+	+	+	1
	<i>Sanionia uncinata</i>	E0	+	+	+	r	+	+	r	+	+	+	+	+	+	r	+	+
	<i>Sciuro-hypnum starkei</i>	E0	.	.	+	.	.	.	.	.	.	.	+	+	.	.	+	+
	<i>Barbilophozia lycopodioides</i>	E0	+	.	.	+	+	+	1	.	.	.	+	1	+	+	+	+
	<i>Bartramia ithyphylla</i>	E0	+	.	r	.	r	.	.	.	.	r	.	.	+	+	.	r
	<i>Oncophorus virens</i>	E0	.	+	.	+	.	.	.	.	.	.	.	+	+	.	.	.
	<i>Pohlia</i> sp.	E0	.	.	.	.	.	.	.	.	.	.	r	1	.	.	.	.
	<i>Dicranum elongatum</i>	E0	+	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.
	<i>Philonotis tomentella</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Cetraria islandica</i>	E0	.	r	r	.	.	.	.	+	.	.	.	.	.	.	.	.
	<i>Paraleucobryum enerve</i>	E0	.	1	+	1	.	.	.	+	.	.	.	.	.	.	.	.
	<i>Lescuraea incurvata</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
	<i>Sciuro-hypnum reflexum</i>	E0	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
	<i>Distichium inclinatum</i>	E0	.	.	.	.	.	.	.	+	.	.	+	+	.	.	.	.
	<i>Heterocladium dimorphum</i>	E0	.	.	+	.	.	.	.	r	.	.	.	.	.	.	.	.
	<i>Hypnum callichroun</i>	E0	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.
	<i>Lescuraea plicatum (Ptychodium plicatum)</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
	<i>Bryoerythrophyllum recurvirostre</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Calliergonella cuspidata</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Climacium dendroides</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Dichodontium pellucidum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Dicranum scoparium</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Tortella tortuosa</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Cladonia rangiferina</i>	E0	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Polytrichastrum alpinum</i>	E0	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
	<i>Mnium spinosum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
	<i>Brachythecium glareosum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Aulacomnium palustre</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Myurella julacea</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Cladonia</i> sp.	E0	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Rhizocarpon geographicum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	<i>Mnium thomsonii</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

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	45	46	Pr.	Fr.			
.	.	.	.	+	+	.	+	+	1	2	2	+	r	.	+	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	13	28		
.	.	.	.	.	.	.	.	+	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	2	1	.	2	.	7	15		
.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	+	.	.	.	.	.	.	.	.	.	1	.	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	9	20	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	2	4	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2
+	+	+	+	+	+	.	+	+	1	1	1	1	1	3	3	1	2	1	2	+	1	+	+	+	+	.	+	1	.	41	89			
+	+	+	+	+	+	.	+	+	.	+	.	.	+	+	.	.	+	+	1	+	+	.	+	2	r	+	.	.	.	3	37	80		
1	+	2	.	.	1	.	+	+	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	2	3	+	.	.	16	35		
.	1	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	15	33		
.	r	.	+	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	12	26		
+	.	+	.	+	.	.	.	.	.	.	.	+	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	+	.	11	24	
.	.	.	+	.	.	.	+	+	.	+	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	+	.	10	22		
.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	+	.	.	.	.	r	+	r	.	.	.	.	.	8	17		
.	r	.	.	.	.	.	.	.	.	.	.	r	r	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	6	13		
.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	6	13		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1	.	.	.	.	.	.	6	13		
.	.	.	2	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	5	11	
.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	4	+	.	.	.	.	.	.	.	2	.	.	.	.	5	11		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	9		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	4	9		
.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	4	9		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	+	.	4	9	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	3	7		
.	.	.	.	.	.	.	.	.	.	.	.	+	r	r	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	7		
.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	r	+	.	.	.	.	.	3	7			
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	7		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	3	7		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	7		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	7		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	3	7		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	2	4		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	.	.	.	.	.	.	.	2	4		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2	4
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	2	4	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	2	4		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	+	.	.	.	.	.	.	2	4		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	2	4	

Number of relevé (Zaporedna številka popisa)		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<i>Peltigera</i> sp.	E0	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Myurella tenerrima</i>	E0	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Dicranum undulatum</i>	E0	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
<i>Lescurea radicata</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
<i>Dicranum fuscescens</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	r	.
<i>Polytrichum piliferum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Campylium stellatum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Tortula mucronifolia</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Fissidens osmundoides</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ptilidium ciliare</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Timmia norvegica</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Lescurea saxicola</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Preissia quadrata</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Hypnum vaucheri</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Palustriella decipiens</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Plagiochila porelloides</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Syntrichia ruralis</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Ditrichum flexicaule</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Distichium capillaceum</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>Syntrichia norvegica</i>	E0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

### Legend – Legenda

Acronym of syntaxa – see Text – okrajšave sintaksonov so pojasnjene v besedilu

TW – Tone Wraber

AM – Andrej Martinčič

ID – Igor Dakskobler

A Limestone – apnenec

L Marlstone – laporovec

R Chert – roženec

Gr Gravel – grušč

Re Rendzina – rendzina

Gr Gravel – grušč

Gl Molic Gleysols – organsko-mineralna tla

Pr. Presence (number of relevés in which the species is presented) – število popisov, v katerih se pojavlja vrsta

Fr. Frequency in % – frekvenca v %

*Sciuro-hypnum glaciale*\* This moss species was collected by Tone Wraber (14. 9. 1967) in the stand of the association *Salicetum herbaceae* s. lat. also on the locality Na Jezerih-Rokavi. Andrej Martinčič found it in Srečko Grom's collection and determined it in 2018.

*Sciuro-hypnum glaciale*\* To mahovno vrsto je nabral Tone Wraber (14. 9. 1967) v združbi zelnote vrbe tudi na nahajališču Na jezerih-Rokavi. Andrej Martinčič jo je našel v zbirki Srečka Groma in jo določil leta 2018.

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	45	46	Pr.	Fr.						
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2			
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2		
.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2		
.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2		
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	2

**Table 2:** Synoptic table of the association *Salicetum herbaceae* s. lat. in the Central, Eastern, Southern and Southeastern Alps

**Tabela 2:** Sintezna preglednica asociacije *Salicetum herbaceae* s. lat. v Centralnih, Vzhodnih, Južnih in Jugovzhodnih Alpah

Successive number (Zaporedna številka)	1	2	3	4	5	6
Number of relevés (Število popisov)	23	10	12	3	7	31
Sign for syntaxa (Oznaka sintaksonov)	SrSh	Sh-Do	Sh-BB	Sh-Eg	ShAc-Eg	ShAc-Eng
Author of relevés (Avtor popisov)	TWAM	ESP	BB	PEg	PEg	TE
<b><i>Salicion herbaceae, Salicetea herbaceae</i></b>						
<i>Salix herbacea</i>	E1	91	100	92	100	100
<i>Gnaphalium supinum</i>	E1	96	30	100	.	14
<i>Soldanella pusilla</i>	E1	100	10	50	67	43
<i>Luzula alpinopilosa</i>	E1	96	20	33	.	.
<i>Sibbaldia procumbens</i>	E1	70	30	83	.	.
<i>Sagina saginoides</i>	E1	52	50	58	67	71
<i>Anthelia juratzkana</i>	E0	65	.	8	33	57
<i>Polytrichastrum sexangulare</i>	E0	57	60	25	.	.
<i>Kiaeria falcata</i>	E0	74	.	17	.	.
<i>Poblia obtusifolia</i>	E0	52	.	8	.	.
<i>Scapania belvetica</i>	E0	35	.	.	.	.
<i>Poblia drummondii</i>	E0	4	.	67	.	.
<i>Sciuro-hypnum glaciale</i>	E0	4	.	25	.	.
<i>Kiaeria starkei</i>	E0	4	.	.	.	.
<i>Cerastium cerastioides</i>	E1	.	20	75	33	14
<i>Cardamine alpina</i>	E1	.	.	67	.	.
<i>Arenaria biflora</i>	E1	.	.	50	.	.
<i>Alchemilla pentaphyllea</i>	E1	.	.	17	.	.
<i>Carex lachenalii</i>	E1	.	.	25	.	.
<i>Carex foetida</i>	E1	.	.	8	.	.
<i>Plantago atrata</i>	E1	.	.	.	67	57
<i>Alchemilla decumbens</i>	E1	.	.	.	67	.
<b><i>Androsacetalia alpinae</i></b>						
<i>Veronica alpina</i>	E1	43	60	67	67	71
<i>Gentiana bavarica</i>	E1	.	10	.	67	57
<i>Sedum alpestre</i>	E1	.	.	42	.	.
<i>Epilobium anagallidifolium</i>	E1	.	.	17	.	14
<b><i>Arabidetalia caeruleae</i></b>						
<i>Salix retusa</i>	E1	96	70	.	.	43
<i>Taraxacum</i> sect. <i>Alpina</i>	E1	35	30	92	.	71
<i>Saxifraga androsacea</i>	E1	17	50	8	67	86
<i>Alchemilla fissa</i>	E1	13	.	.	.	.
<i>Salix reticulata</i>	E1	9	40	.	.	.
<i>Pseudoleskea incurvata</i> (= <i>Lescuraea incurvata</i> )	E0	9	.	.	.	43
<i>Carex parviflora</i>	E1	4	80	.	67	100
<i>Gnaphalium hoppeanum</i>	E1	4	20	.	.	57
<i>Ranunculus traunfeldneri</i>	E1	4	.	.	.	.
<i>Doronicum glaciale</i>	E1	4	.	.	.	.
<i>Potentilla brauneana</i>	E1	.	40	.	67	29
<i>Soldanella minima</i>	E1	.	40	.	.	.
<i>Taraxacum kalbussii</i>	E1	.	40	.	.	.
<i>Alchemilla glaberima</i>	E1	.	40	8	.	.
<i>Arabis caerulea</i>	E1	.	30	.	.	.

Successive number (Zaporedna številka)		1	2	3	4	5	6
<i>Achillea oxyloba</i>	E1	.	30	.	.	.	6
<i>Soldanella alpina</i>	E1	.	20	.	.	14	29
<i>Trifolium pallescens</i>	E1	.	10	.	.	.	.
<i>Ranunculus alpestris</i>	E1	.	.	.	33	100	87
<i>Arabis bellidifolia</i>	E1	.	.	.	.	14	16
<i>Rumex nivalis</i>	E1	.	.	.	.	.	13
<i>Campanula pulla</i>	E1	.	.	.	.	.	6
<i>Soldanella austriaca</i>	E1	.	.	.	.	.	3
<b><i>Tblaspiion rotundifolii, Tblaspietea rotundifolii</i></b>							
<i>Achillea atrata</i>	E1	26	.	.	100	100	68
<i>Rhodiola rosea</i>	E1	9	.	.	.	.	.
<i>Saxifraga sedoides</i>	E1	4	20	.	.	.	.
<i>Festuca nitida</i>	E1	4	.	.	.	.	.
<i>Armeria alpina</i>	E1	.	50	.	.	.	.
<i>Hutchinsia alpina</i> subsp. <i>brevicaulis</i>	E1	.	20	.	.	71	55
<i>Saxifraga oppositifolia</i>	E1	.	.	8	.	.	.
<i>Festuca rupicaprina</i>	E1	.	.	.	33	57	29
<i>Cirsium spinosissimum</i>	E1	.	.	.	33	14	16
<i>Poa minor</i>	E1	.	.	.	.	41	10
<i>Campanula cochleariifolia</i>	E1	.	.	.	.	14	3
<i>Silene vulgaris glareosa</i>	E1	.	.	.	.	14	.
<i>Moehringia ciliata</i>	E1	.	.	.	.	86	42
<i>Sedum atratum</i>	E1	.	.	.	.	29	16
<i>Achillea clusiana</i>	E1	.	.	.	.	.	3
<i>Cerastium carinthiacum</i>	E1	.	.	.	.	.	3
<b><i>Asplenetia trichomanis</i></b>							
<i>Draba aizoides</i>	E1	.	.	.	.	.	3
<i>Silene pusilla</i>	E1	.	.	.	.	.	3
<i>Primula clusiana</i>	E1	.	.	.	.	.	3
<b><i>Loiseleurio-Vaccinietea</i></b>							
<i>Vaccinium gaultherioides</i>	E1	13	10	.	.	.	.
<i>Loiseleuria procumbens</i>	E1	.	20	.	.	.	.
<b><i>Nardion strictae</i></b>							
<i>Nardus stricta</i>	E1	17	.	.	.	.	3
<i>Festuca</i> cf. <i>ovina</i>	E1	.	10	.	.	.	.
<i>Plantago alpina</i>	E1	.	.	8	.	29	13
<b><i>Juncetea trifidi</i></b>							
<i>Agrostis rupestris</i>	E1	100	20	17	33	.	3
<i>Potentilla aurea</i>	E1	78	10	33	.	.	3
<i>Leontodon helveticus</i>	E1	78	10	8	.	.	.
<i>Juncus jacquinii</i>	E1	78	.	.	.	.	.
<i>Campanula scheuchzeri</i>	E1	39	30	.	67	100	58
<i>Geum montanum</i>	E1	26	.	.	.	.	.
<i>Euphrasia pulchella</i>	E1	30	.	.	.	.	.
<i>Hieracium alpinum</i>	E1	9	.	.	.	.	.
<i>Anthoxanthum nipponicum</i>	E1	4	10	.	.	.	3
<i>Juncus trifidus</i>	E1	4	.	.	.	.	.

Successive number (Zaporedna številka)		1	2	3	4	5	6
<i>Carex curvula</i>	E1	.	30	42	.	.	3
<i>Phyteuma hemisphaericum</i>	E1	.	10	.	.	.	.
<i>Primula minima</i>	E1	.	20	.	.	.	3
<i>Leucanthemopsis alpina</i>	E1	.	10	50	.	.	45
<i>Senecio incanus</i> subsp. <i>carniolicus</i>	E1	.	10	.	.	.	.
<i>Veronica bellidioides</i>	E1	.	10	.	.	.	.
<i>Euphrasia minima</i>	E1	.	.	17	.	14	26
<i>Luzula spicata</i>	E1	.	.	.	33	.	.
<i>Ligusticum mutellinoides</i>	E1	.	.	.	.	.	10
<i>Androsace obtusifolia</i>	E1	.	.	.	.	.	6
<b>Oxytropido-Elynon</b>							
<i>Salix serpyllifolia</i>	E1	4	10	.	.	.	.
<i>Antennaria carpatica</i>	E1	.	10	.	.	.	.
<i>Elyna myosuroides</i>	E1	.	10	.	.	.	3
<i>Gentiana nivalis</i>	E1	.	10	.	.	.	.
<i>Carex atrata</i>	E1	.	.	.	.	.	16
<b>Caricion ferrugineae</b>							
<i>Gentiana pumila</i>	E1	17	.	.	.	.	.
<i>Trifolium thalii</i>	E1	.	20	.	.	.	.
<i>Festuca nigricans</i> ( <i>F. melanopsis</i> )	E1	.	.	.	.	.	6
<b>Caricion firmae</b>							
<i>Silene acaulis</i>	E1	22	60	.	33	29	32
<i>Minuartia sedoides</i>	E1	9	.	17	.	14	3
<i>Carex firma</i>	E1	.	10	.	.	.	3
<i>Veronica aphylla</i>	E1	.	.	.	33	14	6
<i>Festuca quadriflora</i>	E1	.	.	.	.	14	13
<i>Saussurea pygmaea</i>	E1	.	.	.	.	.	.
<i>Carex ornithopodioides</i>	E1	.	.	.	.	.	10
<b>Seslerietalia coeruleae</b>							
<i>Gentiana orbicularis</i>	E1	.	10	.	.	.	.
<i>Ranunculus carinthiacus</i>	E1	.	10	.	.	.	.
<i>Galium anisophyllum</i>	E1	.	.	.	33	14	3
<b>Elyno-Seslerietea</b>							
<i>Polygonum viviparum</i>	E1	100	80	33	67	86	74
<i>Homogyne discolor</i>	E1	48	.	.	.	.	.
<i>Bartsia alpina</i>	E1	13	10	.	.	.	26
<i>Alchemilla illyrica</i> ( <i>A. colorata</i> )	E1	13	.	.	.	.	.
<i>Euphrasia salisburgensis</i>	E1	9	.	.	.	.	3
<i>Selaginella selaginoides</i>	E1	4	10	.	.	43	6
<i>Myosotis alpestris</i>	E1	4	.	.	.	.	29
<i>Carex sempervirens</i>	E1	4	.	.	.	.	.
<i>Lotus alpinus</i>	E1	.	10	.	.	.	.
<i>Gentiana verna</i>	E1	.	10	.	.	.	.
<i>Ligusticum mutellina</i>	E1	.	10	50	67	57	3
<i>Ranunculus montanus</i>	E1	.	.	8	33	29	26
<i>Carex ornithopoda</i>	E1	.	.	.	.	14	.
<i>Sesleria caerulea</i>	E1	.	.	.	.	29	6
<i>Viola calcarata</i>	E1	.	.	.	.	.	10
<i>Aster bellidiastrum</i>	E1	.	.	.	.	.	6
<i>Saxifraga exarata</i> subsp. <i>moschata</i>	E1	.	.	.	.	.	6



Successive number (Zaporedna številka)		1	2	3	4	5	6
<i>Leucanthemum atratum</i>	E1	.	.	.	.	.	3
<b>Scheuchzerio-Caricetea fuscae</b>							
<i>Juncus triglumis</i>	E1	.	20	.	.	.	.
<i>Carex capillaris</i>	E1	.	10	.	.	.	.
<i>Carex fusca</i>	E1	.	10	.	.	.	.
<i>Phleum alpinum</i>	E1	.	.	17	.	.	6
<i>Carex nigra</i>	E1	.	.	17	.	.	.
<b>Montio-Cardaminetea</b>							
<i>Saxifraga aizoides</i>	E1	4	.	.	.	.	10
<i>Saxifraga stellaris</i> s. lat.	E1	.	40	8	.	57	32
<i>Montia rivularis</i>	E1	.	10	.	.	.	.
<i>Philonotis fontana</i>	E1	.	.	8	33	.	3
<i>Epilobium alsinifolium</i>	E1	.	.	.	33	.	.
<i>Cratoneuron filicinum</i>	E0	.	.	.	.	14	3
<i>Palustriella commutata</i>	E1	.	.	.	.	14	.
<b>Poo alpinae-Trisetetalia</b>							
<i>Poa alpina</i>	E1	100	60	83	33	71	87
<i>Crepis aurea</i>	E1	13	40	.	33	.	6
<i>Phleum rhaeticum</i>	E1	4	.	.	.	.	.
<i>Poa supina</i>	E1	.	20	.	.	14	13
<i>Trollius europaeus</i>	E1	.	10	.	.	.	.
<i>Deschampsia cespitosa</i>	E1	.	10	.	.	29	13
<i>Poa annua</i> var. <i>varia</i>	E1	.	.	33	.	.	.
<i>Sagina glabra</i>	E1	.	.	8	.	.	.
<i>Trifolium pratense</i> subsp. <i>nivale</i>	E1	.	.	.	.	.	10
<i>Leontodon hispidus</i>	E1	.	.	.	.	.	6
<b>Mulgedio-Aconitetea</b>							
<i>Salix waldsteiniana</i>	E1	.	10	.	.	.	.
<i>Gagea fragifera</i>	E1	.	.	17	.	.	.
<b>Vaccinio-Piceetea</b>							
<i>Homogyne alpina</i>	E1	17	10	8	33	.	10
<i>Polytrichum formosum</i>	E0	.	.	.	33	.	3
<b>Other species (Druge vrste)</b>							
<i>Leontodon</i> sp.	E1	4	.	.	.	.	.
<i>Taraxacum</i> sp.	E1	.	.	.	33	14	.
<b>Mosses and lichens (Mahovi in lišaji)</b>							
<i>Polytrichum juniperinum</i>	E0	87	60	50	33	.	10
<i>Sanionia uncinata</i>	E0	96	.	17	67	14	10
<i>Barbilophozia lycopodioides</i>	E0	52	.	.	.	.	.
<i>Bartramia ithyphylla</i>	E0	43	.	.	.	.	.
<i>Sciuro-hypnum starkei</i>	E0	39	.	.	.	.	.
<i>Oncophorus virens</i>	E0	30	.	.	33	14	3
<i>Paraleucobryum enerve</i>	E0	17	.	.	.	.	.
<i>Distichium inclinatum</i>	E0	17	.	.	.	.	3
<i>Pohlia</i> sp.	E0	13	.	.	.	.	.
<i>Cetraria islandica</i>	E0	13	10	.	.	.	.
<i>Hypnum callichroum</i>	E0	13	.	.	.	.	.
<i>Dicranum elongatum</i>	E0	9	.	.	.	.	.
<i>Heterocladium dimorphum</i>	E0	9	.	.	.	.	.
<i>Polytrichastrum alpinum</i>	E0	4	30	.	.	.	.

Successive number (Zaporedna številka)		1	2	3	4	5	6
<i>Cladonia rangiferina</i>	E0	4	10	.	33	29	3
<i>Cladonia</i> sp. ( <i>pyxidata</i> )	E0	4	10	33	.	.	3
<i>Polytrichum piliferum</i>	E0	4	.	25	.	.	.
<i>Sciuro-hypnum reflexum</i>	E0	2	.	8	.	.	.
<i>Lescuraea plicatum</i> ( <i>Ptychodium plicatum</i> )	E0	4	.	.	.	.	6
<i>Philonotis tomentella</i>	E0	4	.	.	.	.	.
<i>Mnium spinosum</i>	E0	4	.	.	.	.	.
<i>Dicranum fuscescens</i>	E0	4	.	.	.	.	.
<i>Dicranum undulatum</i>	E0	4	.	.	.	.	.
<i>Lescuraea radicata</i>	E0	4	.	.	.	.	.
<i>Myurella tenerrima</i>	E0	4	.	.	.	.	.
<i>Peltigera</i> sp.	E0	4	.	.	.	.	.
<i>Cetraria aculeata</i>	E0	.	10	.	.	.	.
<i>Rhacomitrum canescens</i>	E0	.	10	.	.	.	.
<i>Desmatodon latifolius</i>	E0	.	.	17	.	.	.
<i>Peltigera rufescens</i>	E0	.	.	17	.	.	.
<i>Aulacomnium palustre</i>	E0	.	.	8	.	.	.
<i>Pohlia filum</i>	E0	.	.	8	.	.	.
<i>Pleuroclada albescens</i>	E0	.	.	8	.	.	.
<i>Bryum elegans</i>	E0	.	.	8	.	.	.
<i>Lophozia alpestris</i>	E0	.	.	8	.	.	.
<i>Lecidea neglecta</i>	E0	.	.	8	.	.	.
<i>Brachythecium glareosum</i>	E0	.	.	.	33	29	.
<i>Tortella tortuosa</i>	E0	.	.	.	33	14	19
<i>Bryum</i> sp.	E0	.	.	.	33	57	3
<i>Distichium capillaceum</i>	E0	.	.	.	.	71	32
<i>Dichodontium pellucidum</i>	E0	.	.	.	.	14	.
<i>Ditrichum flexicaule</i>	E0	.	.	.	.	14	.
<i>Pohlia cruda</i>	E0	.	.	.	.	14	3
<i>Bryum pseudotriquetrum</i>	E0	.	.	.	.	.	6
<i>Preissia quadrata</i>	E0	.	.	.	.	.	3
<i>Syntrichia norvegica</i>	E0	.	.	.	.	.	3
<i>Scapania aequiloba</i>	E0	.	.	.	.	.	3
<i>Cladonia arbuscula</i>	E0	.	.	.	.	.	3

### Legend – Legenda

- 1 *Salicetum retuso-herbaceae*, Julian Alps, this article
- 2 *Salicetum herbaceae*, Dolomites, E. & S. Pignatti 2014, 2016
- 3 *Salicetum herbaceae*, Central Alps, Braun-Blanquet 1926
- 4 *Salicetum herbaceae*, Eastern Alps, Eggenberger 1994
- 5 *Arabidetum caeruleae salicetosum herbaceae*, Eastern Alps, Eggenberger 1994
- 6 *Salici herbaceae-Arabidetum caeruleae* var. *Pritzelago alpina-Salix retusa*, Eastern Alps, English 1999

**Table 3:** Groups of diagnostic species in the communities with dominant *Salix herbacea* in the Alps (relative frequencies).

**Tabela 3:** Skupine diagnostičnih vrst v združbah s prevladujočo vrsto *Salix herbacea* v Alpah (relativne frekvence).

Successive number (Zaporedna številka)	1	2	3	4	5	6
Number of relevés (Število popisov)	23	10	12	3	7	31
Sign for syntaxa (Oznaka sintaksonov)	SrSh	Sh-Do	Sh-BB	Sh-Eg	ShAc-Eg	ShAc-Eng
Author of of relevés (Avtor popisov)	TWAM	ESP	BB	PEg	PEg	TE
<i>Salicion herbaceae</i> , <i>Salicetea herbaceae</i>	<b>32,7</b>	<b>16,8</b>	<b>47,0</b>	<b>23,3</b>	<b>14,5</b>	<b>19,2</b>
<i>Androsacetalia alpinae</i>	1,8	3,7	<b>7,1</b>	<b>7,2</b>	5,8	4,5
<i>Arabidetalia caeruleae</i>	<b>7,6</b>	<b>28,4</b>	6,1	<b>12,6</b>	<b>22,7</b>	<b>25</b>
<i>Thlaspion rotundifolii</i> , <i>Thlaspietea rotundifolii</i>	1,8	4,7	0,5	<b>8,9</b>	<b>17,4</b>	<b>12,1</b>
<i>Asplenietea trichomanis</i>	0	0	0	0	0	0,4
<i>Loiseleurio-Vaccinietea</i>	0,5	1,6	0	0	0	0
<i>Nardion strictae</i>	0,7	0,5	0,5	0	1,2	0,8
<i>Juncetea trifidi</i>	<b>18,3</b>	<b>8,9</b>	<b>9,4</b>	<b>7,1</b>	4,7	<b>7,9</b>
<i>Oxytropido-Elynon</i>	0,2	2,1	0	0	0	0,9
<i>Caricion ferrugineae</i>	0,7	1,1	0	0	0	0,3
<i>Caricion firmae</i>	1,2	3,7	0,1	3,5	2,9	3,3
<i>Seslerietalia coeruleae</i>	0	1,1	0	1,8	0,6	0,1
<i>Elyno-Seslerietea</i>	<b>8,0</b>	6,8	5,1	<b>9,0</b>	<b>10,5</b>	<b>9,8</b>
<i>Scheuchzerio-Caricetea fuscae</i>	0	2,1	1,9	0	0	0,3
<i>Montio-Cardaminetea</i>	0,2	2,6	0,9	3,5	3,5	2,4
<i>Poo alpinae-Trisetetalia</i>	<b>4,8</b>	<b>7,4</b>	<b>7,0</b>	3,5	4,7	<b>6,7</b>
<i>Mulgedio-Aconitetea</i>	0	0,5	0,1	0	0	0
<i>Vaccinio-Piceetea</i>	0,7	0,5	0,5	3,5	0	0,6
Other species (Druge vrste)	0,2	0	0	1,8	0,6	0
Mosses and lichens (Mahovi in lišaji)	<b>20,6</b>	7,4	<b>12,1</b>	<b>14,2</b>	<b>11</b>	5,6
Total (Skupaj)	100,0	100	100	100	100	100

#### Legend – Legenda

- 1 *Salicetum retuso-herbaceae*, Julian Alps, this article
- 2 *Salicetum herbaceae*, Dolomites, E. & S. Pignatti 2014, 2016
- 3 *Salicetum herbaceae*, Central Alps, Braun-Blanquet 1926
- 4 *Salicetum herbaceae*, Eastern Alps, Eggenberger 1994
- 5 *Arabidetum caeruleae salicetosum herbaceae*, Eastern Alps, Eggenberger 1994
- 6 *Salici herbaceae-Arabidetum caeruleae* var. *Pritzelago alpina-Salix retusa*, Eastern Alps, Englisch 1999