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Analysis of Natura 2000 habitats and species in the Hohe Tauern National Park Carinthia and Salzburg

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Abstract

The Hohe Tauern National Park Salzburg and Carinthia hosts a Natura 2000 site which covers more than 1000 km². Protection objectives of this Natura 2000 site are habitats (32 types), animal species (10 spp.) and plant species (7 spp.). Its purpose is to maintain or restore habitats and species to an appropriate level and to monitor their status.

Spatial data collection over such a large area is a complicated and resource demanding task. In particular, at the Hohe Tauern, many datasets – at least for certain special fields – were available but with different quality and resolution. The project goal was the development of a GIS based dataset encompassing and harmonizing the existing data sources describing the FFH habitats and their conservation status.

The content of the project "Analysis of Natura 2000 habitats and species in the Hohe Tauern National Park Carinthia and Salzburg" is the proliferation of FFH habitats, animals and plant species; the determination of their conservation status, the storage of all available data and information in a database, the identification of measures and projects to maintain or restore nature-favourable conservation status and the identification of possible shortcomings in the data for the National Park of Salzburg and Carinthia.

Based on the available data, it was assessed the sensitivity and degree of endangerment of the protected areas in respect to the interference given by mountain farming, forestry and tourism. Sensitivity to the different criteria were finally assigned to each of the spatial units making up the spatial dataset. The resulting maps and quality of the work together with the cost effectiveness rate of the whole work demonstrate the suitability of the technique as a viable cost effective tool applicable also to other large protected areas. Furthermore the Standard Data Form of the Natura 2000 sites has been updated.

Keywords

FFH habitat directive, conservation status, management alpine pastures, Austrian and Eastern (Central) Alps

Introduction

The Hohe Tauern National Park Salzburg and Carinthia hosts a Natura 2000 site which covers more than 1000 km². Protection objectives of this Natura 2000 site are habitats (32 types), animal species (10 spp.) and plant species (7 spp.). Its purpose is to maintain or restore habitats and species to an appropriate level and to monitor their status. For such protected areas generic management plans are not sufficient because critical aspects need to be accurately located, therefore they require a detailed and high quality spatial information. At the same time, the collection of spatial data over such large area is a complicated and resource demanding task. In particular, at the Hohe Tauern, many datasets to some degree of extent were already available but they exibhit different quality and spatial resolution. The objectives of the project "Analysis of Natura 2000 habitats and species in the Hohe Tauern National Park Carinthia and Salzburg" are

- development of a GIS based dataset encompassing and harmonizing the existing data sources describing the FFH habitats and their conservation status
- identification of the current status of all FFH habitats (Annex I, habitats directive), animals and plants species listed in Annex II; additionally, extensive research, expert interviews, literature and database evaluations for selected animal key-species of FFH habitats has to be performed
- determination of all FFH habitats, animals and plants species listed in Annex II conservation status
- documention of the spatial arrangement of FFH-habitats and species and their conservation status by maps
- identification of measures and projects to maintain or restore the favourable conservation status
- identification of possible data deficits of the National Park of Salzburg and Carinthia
- documention of all base data and results in a relational database

The results of the project are the basic for a spatially inclusive and comprehensive management plan of the Hohe Tauern National Park.

The project (EGGER et al. 2013) was funded by Salzburger and Känrtner Nationalparkfonds (Mittersill, Großkirchheim) and Amt der Kärntner Landesregierung (Klagenfurt).

Study area

The study area is defined by the border of the Hohe Tauern National Park Salzburg and Carinthia (Außen- & Kernzone). All research data are related to this area. The analysis of the conservation status is related to the Natura 2000 area, which covers the peripheral- and core zone of the Hohe Tauern National Park Salzburg and the core zone of the Hohe Tauern National Park Carinthia.

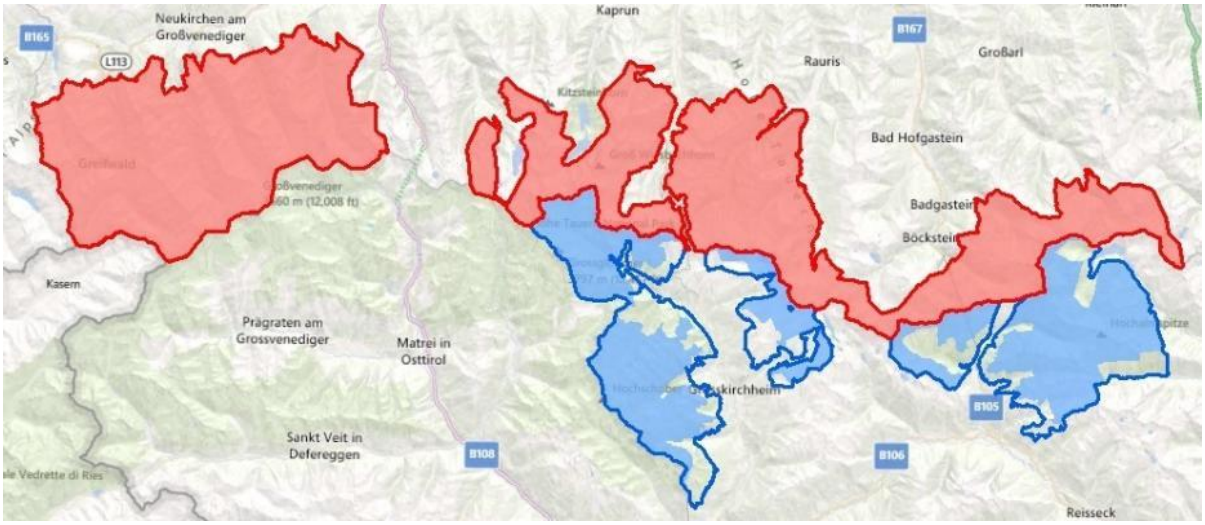

Figure 1: Natura 2000 site Hohe Tauern Salzburg (red area) and Carinthia (blue area:) and Hohe Tauern National Park Salzburg (red border line) and Carinthia (blue border line)

Methods

The existing data sources were available for the whole National Park or at least for large parts of it. The overall data analysis procedure was made up by following steps:

1. localization of FFH-natural habitat types (Annex I), FFH plant species (Annex II) and FFH animal species (Annex II and selected indicator species)
2. evaluation of the conservation status of FFH natural habitat types and species
3. definition of measures

Localization of the FFH-habitat types

The FFH habitats were derived from the combination of the information stored in ArcGIS® thematic layers such as aerial photographs (Habitalp), geology, habitat mapping, forestry inventory and existing maps. The layers data quality and their heterogeneic resolution required the development of an innovative data classification lineage based on multivariate regression statistics and expert knowledge judgment. Thematic layers considered in the analyss were:

- CIR-areal photo interpretatin
- mapping of moor and alpine wet lands from Wittmann
- geology
- digital elavation model (10 m)
- habitat mapping Salzburg
- mapping of mountain and deciduous forest

Localization of FFH-plant species Annex I

The source of information of bryophytes (coordinates of places) are from Mag. Köckinger. The places of lady's-slipper orchid *(Cypripedium calceolus)* are from Dr. Helmut Wittmann.

Determining the conservation status of the Habitats Directive habitat types

For the classification of the site's conservation status, the concept of hemeroby is applied. It takes into account the intensity of the intended and unintended effects of human intervention on ecosystems. The hemeroby concept (BLUME & SUKOPP, 1976) assumes that in the absence or very low impact of the site's conservation status is "favourable" (A), with a greater degree of influence the conservation status is "unfavourable-inadequate" (B) and with a higher degree of influence the conservation status is "unfavourable-bad"(C). Figure 3 shows an overview of the determination of the site's conservation status for Habitats habitats is given.

The sensitivity of the protected areas in respect to the interference given by mountain farming, forestry, tourism, game pressure and water uses was assessed. Sensitivity to the different criteria were finally assigned to each of the spatial units making up the spatial dataset.

The FFH-Habitat types show different sensitivity to the individual impact factors which were individually determined. By linking the impact intensity and sensitivity of each FFH-habitat type we obtain the impact relevance of each FFH-Habitat type. In accordance with ELLMAUER (2005) the total area of the impact relevance of each FFH-Habitat type per impact factor is determined. For the two FFH-Habitat types (7140 Transition mires and quaking bogs and 7240* Alpine pioneer formations of Caricion bicoloris-atrofuscae) the results of WITTMANN et al. (2007a, 2007b) are transferred directly.

The last step is the sum all impact relevances (meant as the combination of the impact relevances of all individual impact factors) and the determination of the site's conservation status in categories A, B and C for each type FFH-habitat type.

Animals

The identification and the monitoring of zoological character species of FFH habitat types is the only way of reaching a fully encompassing ("ecological") evaluation of the conservation status. In this paper 24 zooological character species of the taxa mammals (1 sp.), plant hoppers (5 spp.), true bugs (5), carabid beetles (3), spiders (5 spp.) and harvestmen (5) have been selected to evaluate 19 FFH habitat types. The existing data sources were available for the whole National Park or at least for large parts of it.

The data basic for this project are Biodiversitätsdatenbank Nationalpark Hohe Tauern, ZOBODAT, Zoologische Datenbank des Landesmuseums Kärnten, Datenbank der KFFÖ, Herpetologische Datenbank des Naturhistorischen Museums Wien, Datensätze Thomas Huber, Datensätze Verein für Wildtierforschung, Arthropoda-Datenbank_OEKOTEAM_Komposch, Hopperbase-Datenbank_OEKOTEAM_ Holzinger, BioOffice-Datenbank_OEKOTEAM_Frieß, Land Kärnten & KIS, Collection Paill/Joanneum Graz, Sammlung Ausobsky und Landtierwelt der Mittleren Hohen Tauern.

Determination of measures

The development of nature conservation well-founded measures, based on the existing data, was a key objective of the project. As a basis for the allocation of the measures for the Habitats Directive habitat types were used: impact intensity, impact relevance (sub-area) and, where appropriate, altitude. Furthermore, it was considered that the FFH animal and plant species has to be promoted and ensured by means of appropriate measures in the medium and long term.

Database

Within the project a relationsl database built on SQL Server 2008™ is created. This database contains the results of the analysis as well as all input data. The geometries of the GIS data were integrated as spatial data types in the database and are available through GeoServer as a WMS (Web Map Service) or WFS (Web Feature Service). Point-type data were imported directly into the database BioOffice in Salzburger Haus der Natur. The data can be queried via BioOffice online or also on GeoServer. Furthermore, the database contains tables and views containing reference to the most important results.

Results

Extension and conservation status of the FFH-habitat types:

Approximately 75% (Salzburg) and 77% (Carinthia) of the Natura 2000 area are occupied by FFH-habitat types. The most extensive habitat types are, with a total of about 30% (Salzburg), and 25% (Carinthia), the silicate neglected grassland types (codes: 6150, 6230). Additionally there are in both Natura 2000 areas only few sites with limestone neglected grassland (approx. 3.5%). Approximately 15% (Salzburg) and 20% (Carinthia) are covered by boulders and rocks with pioneer vegetation (codes: 8110, 8120, 8210, 8220). Approximately 10% ist covered by glaciers (code: 8340). The proportion of forest (codes: 9410, 9420) is due to the hight altitude of the nature 2000 area about only 10%.

In view of the conservation status, the two Natura 2000 sites differ significantly in Salzburg and Carinthia. In Salzburg, the grasslands at lower altitudes (codes: 6230, 6510, 6520) are consistently rated as "B", and the alkaline fens (code: 7230) are also classified as "B". In contrast, all of Carinthia FFF habitat types are classified as "A".

Conservation status of mosses and vascular plants:

In the whole study area, no mosses were covered by the Annex II of the Habitats Directive were found.

The Lady's Slipper (*Cypripedium calceolus*) is not significantly present in the Hohe Tauern National Park (it is only known in one point). Therefore, the site's conservation status is not classified.

Conservatin status animals:

The current classification of the animals in Annex II of the Habitats Directive differs in many cases from the initial classification listed in the standard data form. The number of consistent in terms of their conservation status of protected animals is 4 Carinthia and Salzburg only 2 out of 10. Obvious changes are the conservation status of *Euphydryas aurinia*, currently with classification "A" while in the Standard Data Form for Carinthia was classified with a "D". Salzburg for the *Bombina variegata* was classified in the Standard Data Form "B", although this value is based on the current data "D". *Cottus gobio* and *Lutra lutra* were corrected for Salzburg by one level down.

Table 1: Area of FFH-habitat types in Hohte Tauern National Park Salzburg, impact relevance of alpine pasture farming (Almwirtschaft, AW), of infrastructe and tourism (IT), forestry (FW) and water use (1=no-low, 2=moderate, 3=high) and conservation status (GEZ; A=favourable, B=unfavourable –inadequate, C=unfavourable-bad).

FFH-Code	FFH-Habitat type	area NP [ha]	area NP [%]	EEH AW	EEH IT	EEH FW	EEH WW	GEZ
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	21	0,03	1	2			A
3160	Natural dystrophic lakes and ponds	<1	< 0,01	1	1			A
3220	Alpine rivers and the herbaceous vegetation along their banks .	49	0,06	1	2		1	A
4060	Alpine and Boreal heaths	3.437	4,27	1	1			A
4070	*Bushes with Pinus mugo and Rhododendron hirsutum (Mugo-Rhododendretum hirsuti)	2.112	2,62	1	1			A
6150	Siliceous alpine and boreal grasslands	10.157	12,62	1	1			A
6170	Alpine and subalpine calcareous grasslands	2.904	3,61	2	1			A
6230	*Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) – montane region	696	0,86	2	2			B
6230	*Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) – subalpine region	10.873	13,51	1	1			A
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	111	0,14	1	1			A
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	17	0,02	2	2			B
6520	Mountain hay meadows	214	0,27	2	2			B
7110	*Active raised bogs	<1	< 0,01	1	3			D
7140	Transition mires and quaking bogs	28	0,04	2	2			A*
7230	Alkaline fens	20	0,03	3	1			B (C)
7240	*Alpine pioneer formations of Caricion bicoloris-atrofuscae	5	0,01	1	3			A*
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsetalia ladani)	5.426	6,74	1	1			A
8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)	456	0,57	1	1			A
8210	Calcareous rocky slopes with chasmophytic vegetation	1.241	1,54	1	1			A
8220	Siliceous rocky slopes with chasmophytic vegetation	5.911	7,34	1	1			A
8340	Permanent glaciers	7.658	9,51	1	1			A
9140	Medio-European subalpine beech woods with Acerand Rumex arifolius	1	< 0,01	1	1	2		A
9180	*Tilio-Acerion forests of slopes, screes and ravines	143	0,18	1	1	2		A
91D3	*Mountain pine bog woods	1	< 0,01	1	3	1		B (C)
91E0	*Alluvial forests with Alnus glutinosaand Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	74	0,09	2	2	2		B (C)
9410	Acidophilous Picea forests of the montane to alpine levels (Vaccinio-Piceetea)	5.720	7,1	1	1	2		A
9420	Alpine Larix decidua and/or Pinus cembra forests	2.735	3,4	1	1	1		A
No FFH		20.499	25,46					
Total		**80.508**	**100**					

Table 2: Area of FFH-habitat types in Hohte Tauern National Park Carinthia, impact relevance of alpine pasture farming (Almwirtschaft, AW), of infrastructe and tourism (IT), forestry (FW) and water use (1=no-low, 2=moderate, 3=high) and conservation status (GEZ; A=favourable, B=unfavourable –inadequate, C=unfavourable-bad).

FFH-Code	Brief description	area NP [ha]	area NP [%]	EEH AW	EEH IT	EEH FW	EEH WW	GEZ
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation	3	0,01	1	1			A
3220	Alpine rivers and the herbaceous vegetation along their banks .	30	0,07	1	1			A
4060	Alpine and Boreal heaths	1.152	2,62	1	1			A
4070	*Bushes with Pinus mugo and Rhododendron hirsutum (Mugo-Rhododendretum hirsuti)	452	1,03	1	1			A
6150	Siliceous alpine and boreal grasslands	7.714	17,54	2	1		1	A
6170	Alpine and subalpine calcareous grasslands	1.498	3,41	2	1			A
6230	*Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) – montane region	226	0,51	1	1			A
6231	*Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) – subalpine region	4.053	9,22	1	1			A
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	47	0,11	1	1			A
6520	Mountain hay meadows	41	0,09	1	1			A
7230	Alkaline fens	5	0,01	1	1			A
7240	*Alpine pioneer formations of Caricion bicoloris-atrofuscae	100	0,23	1	1			A
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsetalia ladani)	4.101	9,33	1	1			A
8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)	271	0,62	1	1			A
8210	Calcareous rocky slopes with chasmophytic vegetation	566	1,29	1	1			A
8220	Siliceous rocky slopes with chasmophytic vegetation	4.303	9,79	1	1			A
8340	Permanent glaciers	4.229	9,62					A
9140	Medio-European subalpine beech woods with Acerand Rumex arifolius	3	0,01	1	1			A
9180	*Tilio-Acerion forests of slopes, screes and ravines	45	0,1	1	1	2		A
9,10E+01	*Alluvial forests with Alnus glutinosaand Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	38	0,09		1	2		A
9410	Acidophilous Picea forests of the montane to alpine levels (Vaccinio-Piceetea)	2.609	5,93	1	1	2		A
9420	Alpine Larix decidua and/or Pinus cembra forests	2.522	5,74	1	1	2		A
No FFH		9.959	22,65					
Total		**43.966**	**100**					

Table 3: Old and new conservation status of the animals of the FFH-Habitat directive Annex II in Hohte Tauern National Park Carinthia and Salzburg (A=favourable, B=unfavourable –inadequate, C=unfavourable-bad, D=not significant).

			Conservation status Carinthia		Conservation status Salzburg	
No	**Scientific name**	**English name**	**new**	**old**	**new**	**old**
1	*Euphydryas aurinia*	Marsh Fritillary	A	D	A	A
2	*Bombina variegata*	Yellow-bellied toad	x	---	D	B
3	*Cottus gobio*	European bullhead	x	---	C	B
4	*Rhinolophus hipposideros*	Lesser horseshoe bat	D	D	B	B
5	*Barbastella barbastellus*	Barbastelle	x	---	?	B
6	*Myotis myotis*	Greater mouse-eared bat	D	D	D	---
7	*Ursus arctos*	Brown bear	D	D	D	---
8	*Lutra lutra*	European otter	x	---	C	B
9	*Lynx lynx*	Eurasian lynx	D	D	D	---
10	*Canis lupus*	Gray wolf	D	---	D	---

Management measures

In total, 6 types of management measures for open land (not usable area, alpine madows) and 5 types of measurement has been assigned for forests and locates in maps.

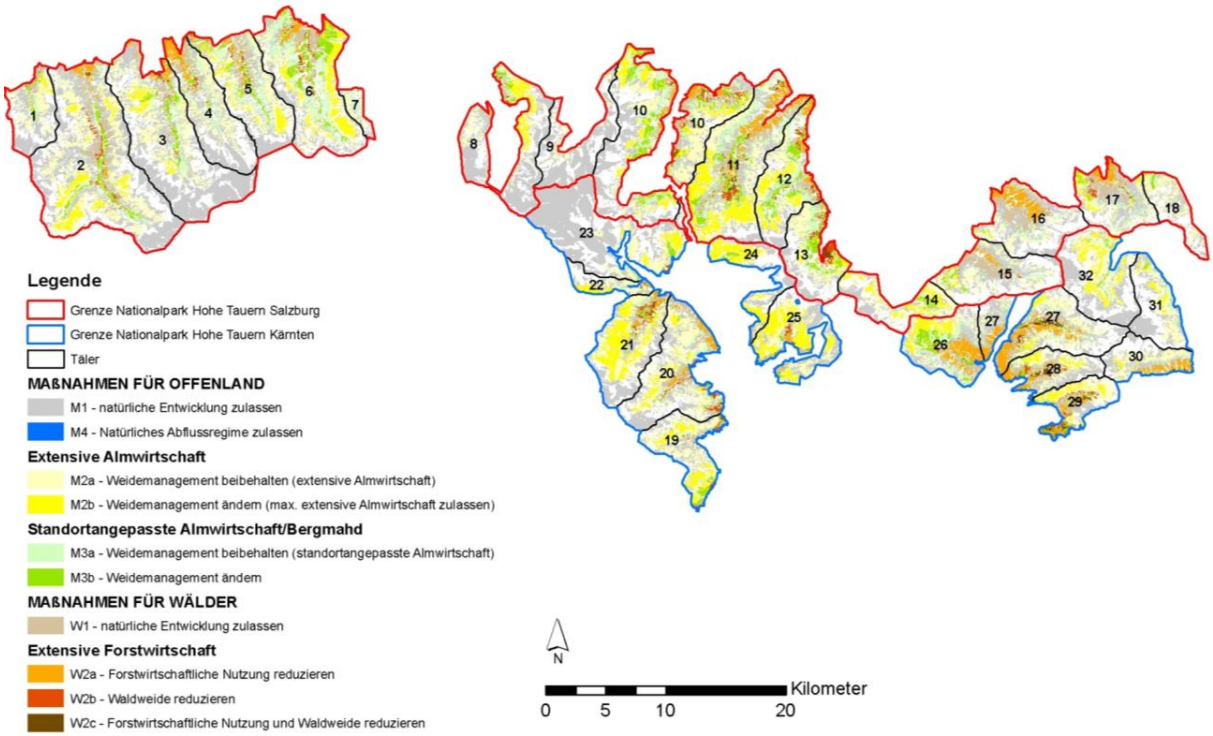

Figure 2: Management measures for open land (M1=natural development; M2=Extensive alpine pasture farming: M2a=Maintain extensive pasture management, M2b=Change/reduction of pasture intensity; M3=Locally adapted pasture/mountain meadows management: M3a=Maintain locally adapted pasture management, M3b=Change/reduction of pasture intensity; M4=Natural flow regime) and forests (W1=natural development; W2=Extensiv forestry: W2a=Reduction of forestry use, W2b: Reduction of forest grazing, W2c: Reduction of forestry use and forest grazing)

The specific management measures and explanations are given in detail within the description of all habitat types and species (EGGER et al. 2013). In addition, the following specific wildlife management measures are recommended:

- continuation and/or resumption of hay
- public relations
- sectoral, animal group-specific measures
- in-depth inventory surveys
- no further expansion of the road network (footpaths, roads).

Dicsussion and Conclusion

The resulting maps and quality of the work together with the cost effectiveness rate of the whole work demonstrate the suitability of the technique as a viable cost effective tool applicable also to other large protected areas.

Regarding the results of the conservation status, the Hohe Tauern National Park Carinthia clearly performs better than Salzburg. This could be essentially due to the inclusion of the more intensively used pastures in the peripheral zone of the National Park Salzburg. In the Hohe Tauern National Park Carinthia, the more extensively used core zone is just designated as Natura 2000 site.

In the assessing with "A" of the conservation status of the FFH-habitat type “Permanent glaciers” (code: 8340) global warming is not considered. Given the dramatic decline of glaciers, the score would likely be more severe ("C"?), though such point deserved a more thorough and dedicated discussion.

It was found that, the most important impact factor for the Natura 2000 habitat types is alpine farming. A second relevant facor ist tourism and infrastructres.

Despite a generally good data quality and data availability there are deficits due to the high complexity of the proposed questions. These are particularly relevant in view of the basic data to determine the habitats types and the state of consveration. Particular for the evaluation of the impact relevance on the individual polygons systematic field surveys are necessary. There is a high need for research related to Mountain hay meadows (code: 6520), Species-rich Nardus grasslands (code: 6230), Alpine and subalpine calcareous grasslands (code: 6170) and nearly all animals of FFH Habitat directive Annex II.

References

BLUME, P. & H. SUKOPP 1976. Ökologische Bedeutung anthropogener Bodenveränderungen. Schriftenreihe Vegetationskunde 10: 7-89. Bonn, Bad Godesberg.

ELLMAUER, T. (ed.) 2005. Entwicklung von Kriterien, Indikatoren und Schwellenwerten zur Beurteilung des Erhaltungszustandes der Natura 2000-Schutzgüter. Band 3: Lebensraumtypen des Anhangs I der Fauna-Flora-Habitat-Richtlinie. Wien.

EGGER, G., MERKAČ, N., AIGNER, S., KOMPOSCH, C., KOMPOSCH, B., SCHREILECHNER, P. & R. LINDNER 2013. Naturraum-Analyse: Natura 2000 Schutzgüter Nationalpark Hohe Tauern Kärnten und Salzburg. Project report (not published), Umweltbüro GmbH, ÖKOTEAM - Institut für Tierökologie und Naturraumplanung OG, BGIS GmbH, 351, Klagenfurt, Graz, Salzburg.

HOFFERT, H., SENITZA, E., EGGER, G. & S. AIGNER 2006. Methodenentwicklung zur Harmonisierung von Lebensräumen nach Anhang I der FFH-Richtlinie im Nationalpark Hohe Tauern zu den im Projekt Habitalp interpretierten CIR-Typen. Projektbericht. (ARGE CIR-Natura2000), 119 p, Nussdorf.

WITTMANN, H., KRISAI, R., STÖHR, O. & S. GEWOLF 2007a. Erfassung der Moore im Nationalpark Hohe Tauern in den Bundesländern Kärnten, Salzburg und Tirol. Pflanzensoziologische und standort ökologische Untersuchung der Moore im NPHT. Institut für Ökologie, final project report (not published), 389 p., Salzburg.

WITTMANN, H., KRISAI, R., STÖHR, O. & S. GEWOLF 2007b. Vollerfassung und Dokumentation der alpinen Schwemmländer mit Pionierformationen des Caricion bicoloris-atrofuscae im Nationalpark Hohe Tauern. Institut für Ökologie, final project report (not published), 134 p., Salzburg.

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Artikel/Article: Analysis of Natura 2000 habitats and species in the Hohe Tauern National Park Carinthia and Salzburg. 159-165