

M.Sc. Programme
"Management of Protected Areas"

Visitor Management in the National Park Gesaeuse

A Mixed Method Approach Including a Checklist

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1 SUMMARY

1.1 Introduction

In 2003 the Gesaeuse was designated as National Park according to the IUCN category II; according to the EU legislation it is a Natura 2000 site as well. Both categories of protected areas have different objectives and priorities, which the National Park's visitor management concept follows by balancing the aims of nature protection with that of high quality nature experience and recreation.

1.2 Study area

The National Park is located in the Ennstaler Alpen, which are part of the North eastern Limestone Alps in Austria. With an area of 11,054 hectares, the Gesaeuse National Park is the third largest of the six Austrian National Parks. The size of the planning area comprises 12,400 hectares and the Natura 2000 site consists of 14,500 hectares. 86 % of the National Park is designated 'Natural Zone', where the virgin landscape is subject to nature protection. The rest is a so-called 'Conservation Zone'. Here the central protective concern is an area of natural land which has been cultivated by man (www.nationalpark.co.at).

1.3 Methods

The concept is mainly based on the model of VERP - Visitor Experience and Resource Protection Framework – the principles of which are currently being used in many US National Parks (MANNING 2007). Yet, it was adapted to the needs of the *National Park Gesaeuse*, considering the legal situation of the protected area as well as the resource and tourist background. In addition, the Natura 2000 standards had to be included. On this behalf, the risk analysis concept for Natura 2000 species and habitats according to PROEBSTL et al. (2007) was adapted. It takes into account the conservation status of habitats and species, the relevance and intensity of tourism use, as well as the efficiency of management actions.

The concept includes the following steps:

- Creation of an interdisciplinary project team
- Definition of park purpose and significance
- Collection of basic data on resources and visitor use
- Description of visitor experience and resource conditions
- Impact assessment of visitor use on sensitive habitats and species (risk analysis)
- Designation of management zones and areas of conflicts
- Definition of indicators and standards for each zone
- Definition of management actions
- Monitoring of resource and social indicators

1.4 Results

Objectives and purpose of the visitor management

The conservation of characteristic animals and plants of the region, the maintenance of a favourable conservation status of Natura 2000 habitats and species as well as a high quality of visitor experience on recreation and education are the main purposes of the National Park.

Basic data on legislation, tourism and resources

Regulations and laws are summarized in the annex (16.1 Legal basis). The most important regulations which affect the visitor management include the Navigation Regulation, the Law on the permission of cross-country walking in mountainous areas *Wegefreiheit im Bergland* and the prohibition to enter river banks and wetland areas within the National Park, except marked areas.

In addition, basic data comprise on the one hand data on tourism in the region (structure, statistics on beds and overnight stays, data on refuges and huts, etc.), on infrastructure (road network, logging roads and parking places, etc.) as well as on public transports and the project 'Xeismobil'. On the other hand all available data on sensitive habitats and species as well as the conservation status of Natura 2000 habitats and species were taken into account.

Visitor use in the National Park

More than 32,000 people attended the National Park's programme in 2006, which offers special events in summer, winter and for schools.

Major visitor facilities include the information centre in Admont and the pavilion in Gstatterboden with a geological exhibition. Three nature trails should concentrate visitors along the rivers *Enns* and *Johnsbach*.

Within this chapter all available information on different activities in the National Park is collected and summarized. Main activities include hiking, climbing, mountainbiking, rafting, canyoning and recreation at the river in the summer. During wintertime ski mountaineering is the main action. Detailed data on the number of visitors, recreation quality and crowding on trails are not available, yet. Therefore, intensity of use on hiking trails, climbing tours and ski mountaineering routes were estimated and classified in three categories (low, moderate and high intensity of use). Indirect data exist on self registration in summit logs. Data on the mountainbike route 'Hochscheiben' lack.

Concerning water sports and recreation at the river, only data on the number of boats in 2005 are available. The maximum were 55 boats per day during weekends. Rafting with big boats (more than 3 persons) is limited to commercial tour operators having a licence.

Apart from the National Park programme, commercial tour operators offer rafting, canyoning and mountain tours.

Impact assessment and risk analysis

The risk analysis showed high risk of spoiling for river habitats and species due to rafting, mainly. In addition, hiking and ski mountaineering affects grouse species negatively (Table 1).

	Conservation status	Hiking	Climbing	Rafting, kayaking, etc.	Canyoning	Recreation at the river	Angling	Mushrooming	Aviation	Ski mountaineering	Snowshoeing
Natura 2000 habitats and species											
3220 Alpine rivers and the herbaceous vegetation along their banks	B	1		3	1	3	2				
1098 Ukrainian brook lamprey <i>Eudontomyzon mariae</i>	B			3	1	1	1				
1131 Varione <i>Leuciscus souffia</i>	C			3	2	2	2				
1163 European Bullhead <i>Cottus gobio</i>	B			3	1	1	1				
1355 Otter <i>Lutra lutra</i>	C			3	2	3	3				
1902 Lady's slipper <i>Cypripedium calceolus</i>	B	2									
A091 Golden eagle <i>Aquila chrysaetos</i>	B	2	1						3	2	
A103 Peregrine Falcon <i>Falco peregrinus</i>	B								2		
A104 Hazel grouse <i>Bonasa bonasia</i>	B	2						1		3/1	2
A108 Capercaillie <i>Tetrao urogallus</i>	B	3						1		3/2	3
A215 Eagle owl <i>Bubo bubo</i>	B								2		
A234 Grey-headed woodpecker <i>Picus canus</i>	C	1									
A408 Ptarmigan <i>Lagopus mutus</i>	B	3							2	3	
A409 Black grouse <i>Tetrao tetrix</i>	B	3							2	3	1
Additional:											
Common sandpiper <i>Actitis hypoleucos</i>	'C'			3	2	3	3				
Red deer and chamois <i>Cervus elaphus</i> , <i>Rupicapra rupicapra</i>	'A'	1									
Alpine marmot <i>Marmota marmota</i>	'A'	2/1									
Grayling <i>Thymallus thymallus</i>	'B'			3	1	1	1				
Speikboeden	?	2									

Table 1. Summary of risk analysis. 1 = low risk of spoiling, 2 = moderate, 3 = high. Conservation status A = excellent, B = good and C = average.

Management zones and areas of conflicts

Depending on the visitor activities and management requirements seven management zones were designated: river zone, nature trail zone, hiking zone, climbing zone, ski mountaineering zone, resource protection zone and developed zone.

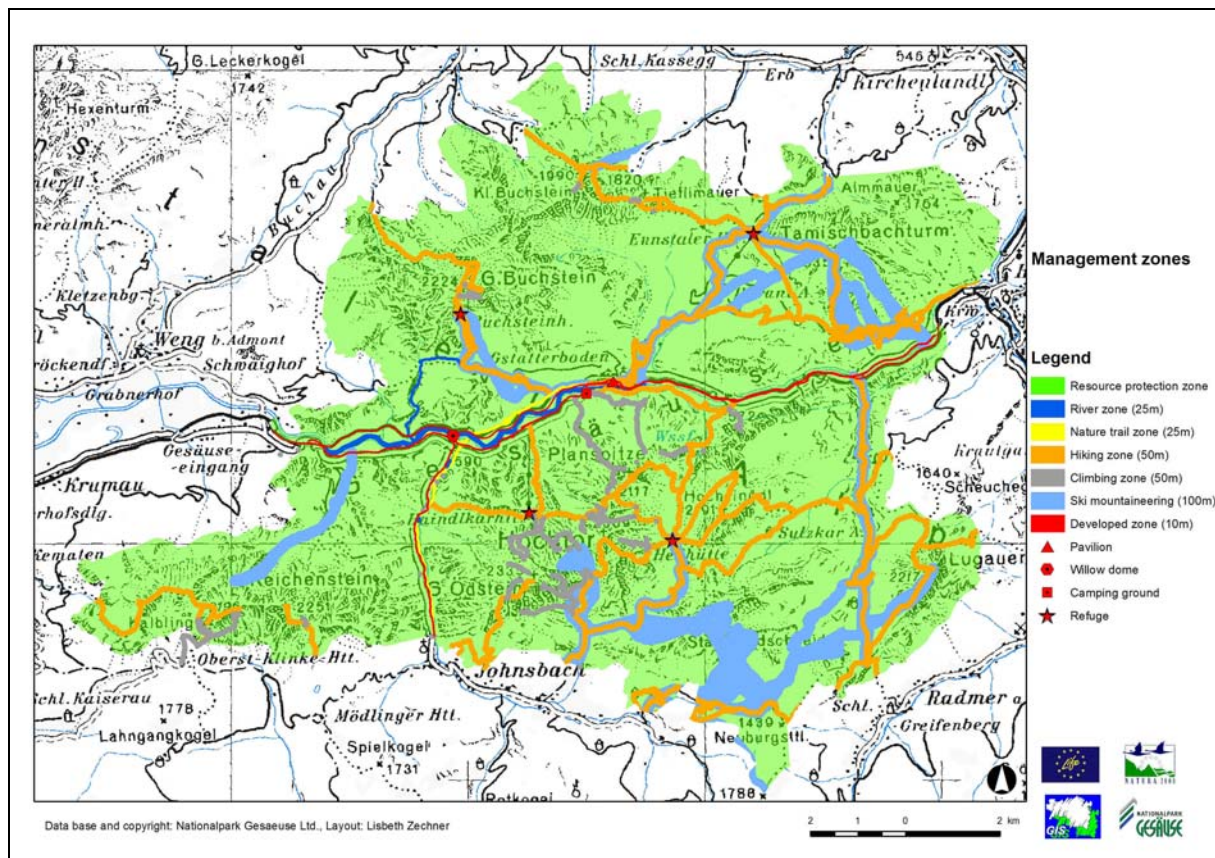


Figure 1. Management zones.

For each zone the type of area, natural resources within sensitive habitats and species, accessibility and potential activities, visitors' experience, intensity of use, infrastructure and management, as well as development and future conditions are described.

Areas of conflict are found within the river zone along the River Enns, e. g., the *Gesäuseeingang*, the *Haselau*, the *Bruckgraben* mouth, the *Johnsbach* mouth, the *Finstergraben*, the *Haindlkargraben* and the *Schneiderwartgraben*, which are breeding sites of common sandpiper. In addition, along the *Johnsbach* the section between *Langgries* and *Kainzenalblgraben* is to be mentioned, which affects river and nature trail zone. In the ski mountaineering zone relevant conflicts exist in *Gstatterboden* (capercaillie), at the *Gscheideggkogel* (capercaillie, black grouse) and at the *Huepflingerhals/Zirbengarten* (black grouse). Additional conflicts may occur with ptarmigan at the *Stadelfeldschneid*.

Management actions

According to the precautionary principle, management actions can already be taken, once any sign of negative impact on species or habitats is given. Existing planned management actions are listed for each management zone. Planned management comprises for instance the amendment of the Navigation Regulation, temporal limitations of rafting and canyoning, the order to walk dogs on leash only, the improvement of markings, information panels and enhanced

ranger controls in sensitive habitats, as well as management actions for sensitive species, e. g. grouse species.

In addition, management actions are defined concerning excursions within the National Park programmes (use of vehicles), visitor facilities (night time illumination, etc.), events, commercial tour operators, training of National Park employees and rangers, public relations and communication.

Indicators, standards and monitoring

Within this concept a first definition of indicators and possible standards as well as a draft of a monitoring plan is included. It will be completed and improved within the next two years. In order to achieve this, different experts will be involved. Resource indicators include mainly Natura 2000 habitats and species as well as other sensitive species (e. g., ground beetles, common sandpiper for the river zone). Social indicators comprise visitor numbers, crowding, satisfaction on recreation quality, observation of wildlife, pollution by garbage and faeces, etc. and have to be collected via visitor surveys. In addition, a monitoring plan to control the efficiency of management actions is necessary.

1.5 Checklist

The checklist follows the steps of VERP (U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE 1997) by using the checklist of PROBSTL et al. (2007) and the contents of POMEROY et al. (2004). Furthermore EAGLES et al. (2002) and 'A handbook for practitioners' of Eurosite (www.eurosite-nature.org/IMG/pdf/mp_guidance_jul04.pdf) were taken into account.

1.6 Conclusion

Although the legal, natural and infrastructural conditions are different compared to U.S. conditions, the VERP Framework was selected because it seems to be the best applicable framework for the current situation in the National Park Gesäuse taking into consideration the other frameworks. Still, the framework had to be adapted to these preconditions.

Participation will be one of the key roles within the future development of this concept as basic data for many sectors are still missed. In the following years it will be one main task for the National Park to collect data on visitors' numbers, their motivation to come to the National Park, visitors' satisfaction with the offers of the National Park, the quality of visitors' experience, etc. Concerning data on resources, the check of erosion and trampling along hiking trails will be one important part of data collection as well. In addition, surveys for Natura 2000 habitats and species have to be improved. Currently, the conservation status of some habitats and species is not clear (cp. risk analysis). Including new and detailed data, this concept has to be completed, concretised and up-dated. The results on the elaboration of indicators, standards and monitoring plan are going to be part of the after-LIFE-management plan. The management actions have to be adapted taking into account the results of monitoring.

2 INTRODUCTION

2.1 Preface

The Gesaeuse has been designated as a National Park according to the IUCN category II and as a Natura 2000 site according to the EU legislation. Both protection categories have different aims and priorities.

Whereas in Natura 2000 sites the protection of certain species and habitats is the main goal (GLATZ et al. 2007), National Parks mainly focus on environmental education as well as recreation, which is considered as important as nature conservation and research. This difference implicates a lot of mainly unsolved conflicts. On the one hand, possibilities for nature experience and education are intensified, on the other hand, increasing numbers of visitors cause higher pressure and negative impacts on nature resources. Therefore, visitor management has become a special task for the administration of the National Parks. Protecting both resources and visitor experience can be very challenging for parks experiencing increasing visitation and diverse types of activities. To comply with this, adequate measures, concepts and guiding principles must be developed (HENNING & LAUBE 2005, HENNIG 2006, PETTEBONE et al. 2006)

Conservation efforts in Natura 2000 sites focus on the maintenance or restoration of the favourable conservation status of a natural habitat type in Annex I, of a species in Annex II of the Habitats' Directive or in Annex I of the Birds' Directive. They include a clear formulation of goals and measures. The legal background for the management plan is the article 6 of the Habitats' Directive. Management plans are the basis for the monitoring of the conservation status (article 11), for the report to the EC commission on the implementation of measures and the costs (article 17 and 8), and if necessary for the assessment of plans or projects affecting Natura 2000 sites (eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML).

The National Park management plan is an instrument to fulfil the strategies and goals of the National Park, which includes all aspects of management. For this reason the visitor management concept takes into account all other plans for the National Park, i. e. wildlife management, research, education, etc. (EAGLES et al. 2002).

2.2 Objectives and purpose of visitor management

This visitor management concept follows a two method approach, which considers the standards of Natura 2000 and IUCN category II, respectively. Its aim is to balance nature protection and recreation as well as nature experience and education. Therefore it is most important to find the means to protect the resources and their dynamic development, while offering visitor experience and education of high quality. Management measures are planned according to a

precautionary principle to secure the highest level of nature protection and to minimize negative impacts of recreation use.

The main objectives of the visitor management focus on providing a high recreation quality and on concentrating visitors in certain areas instead of spatial expansion of leisure time activities in order to reduce disturbance in most parts of the National Park. This means that also excursions and other activities within the National Park's programme should take place in these areas.

The concept is mainly based on information and creation of awareness rather than prohibition and fines. Thus the programme's success is depending on the visitors' voluntariness. This circumstance makes it highly desirable to finalise the draft of the concept by means of participation which involves regional politicians, stakeholders and opinion leaders.

3 STUDY AREA

The National Park Gesäuse was established in October 2002 and was designated according to the IUCN category II in December 2003.

It is located in the so called *Ennstaler Alpen*, which are part of the North eastern Limestone Alps, and mainly includes the *Buchstein* group in the north and the *Hochtor* group with its highest peak the *Hochtor* (2369 m asl.) in the south.

99 % of the area is owned by the Styrian Provincial Forestry Commission (*Steiermaerkische Landesforste*). The rest is public land (the rivers *Enns* and *Johnsbach*) or private (one alpine pasture). Parts of the National Park belong to the municipalities of *Johnsbach*, *Weng*, *Admont*, *Landl*, *Hieflau* and *St. Gallen* (www.nationalpark.co.at).

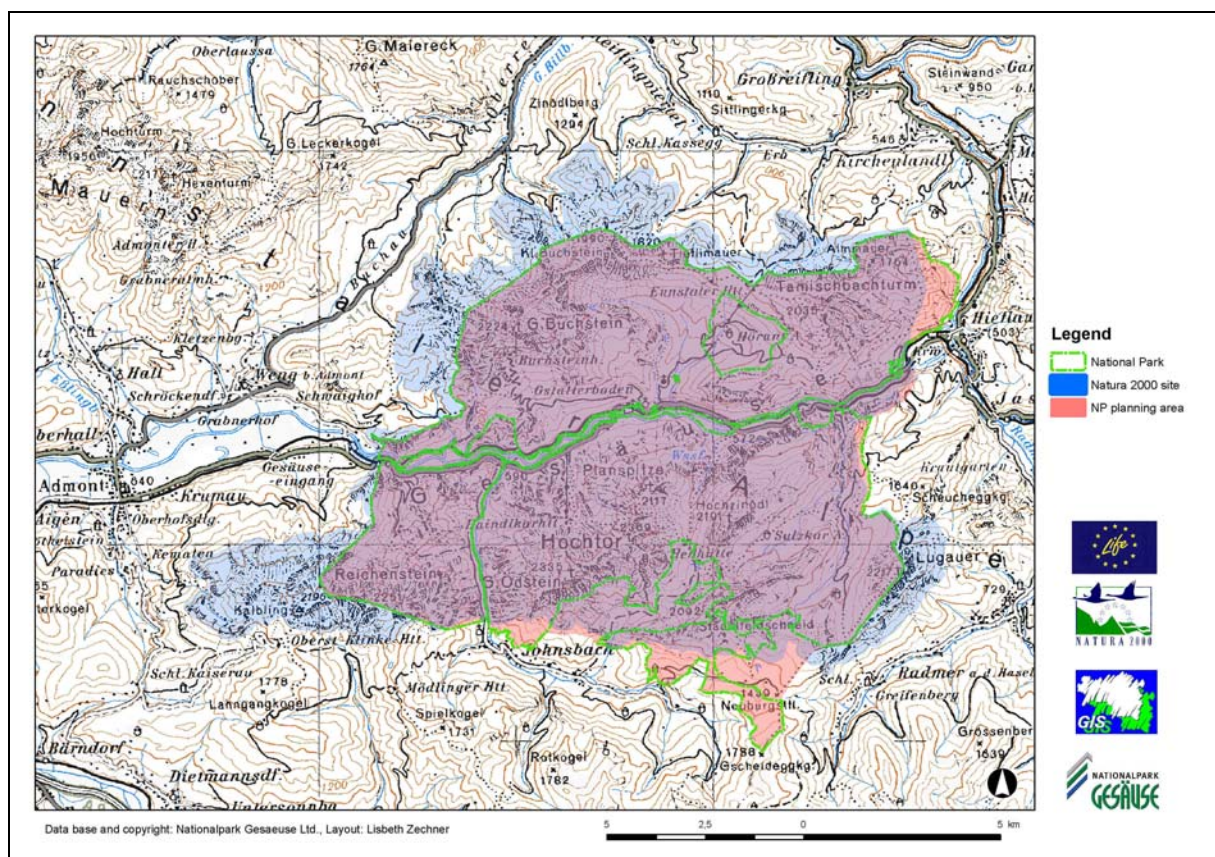


Figure 2. Overview on the study area.

The National Park is managed and administrated by the National Park Ltd., which established four departments to cover the different tasks: First, the department of nature conservation and management, which includes all tasks concerning nature protection, management actions and research. Secondly, the department of environmental education, which deals with the different visitor programmes of

the National Park. Thirdly, the department of public relations is responsible for all activities concerning presentation and information. And finally, the tasks of the fourth department, forest and wildlife management, are managed by the Styrian Provincial Forestry Commission (*Steiermaerkische Landesforste*).

3.1 Conservation status and zonation

With an area of 11,054 hectares, the Gesaeuse National Park is the third largest of the six Austrian National Parks. The size of the planning area comprises 12,400 hectares and the Natura 2000 site is 14,500 hectares. The Natura 2000 site covers 94 % of the National Park area.

86 % of the National Park is designated 'Natural Zone', where the virgin landscape is subject to nature protection. The rest is a 'Conservation Zone'. Here the central protective concern is an area of natural land which has been cultivated by man (www.nationalpark.co.at).

The area is subject of additional conservation categories: 9 % of the area are part of the nature park *Eisenwurzen*. Furthermore seven natural monuments are found in the Natura 2000 site.

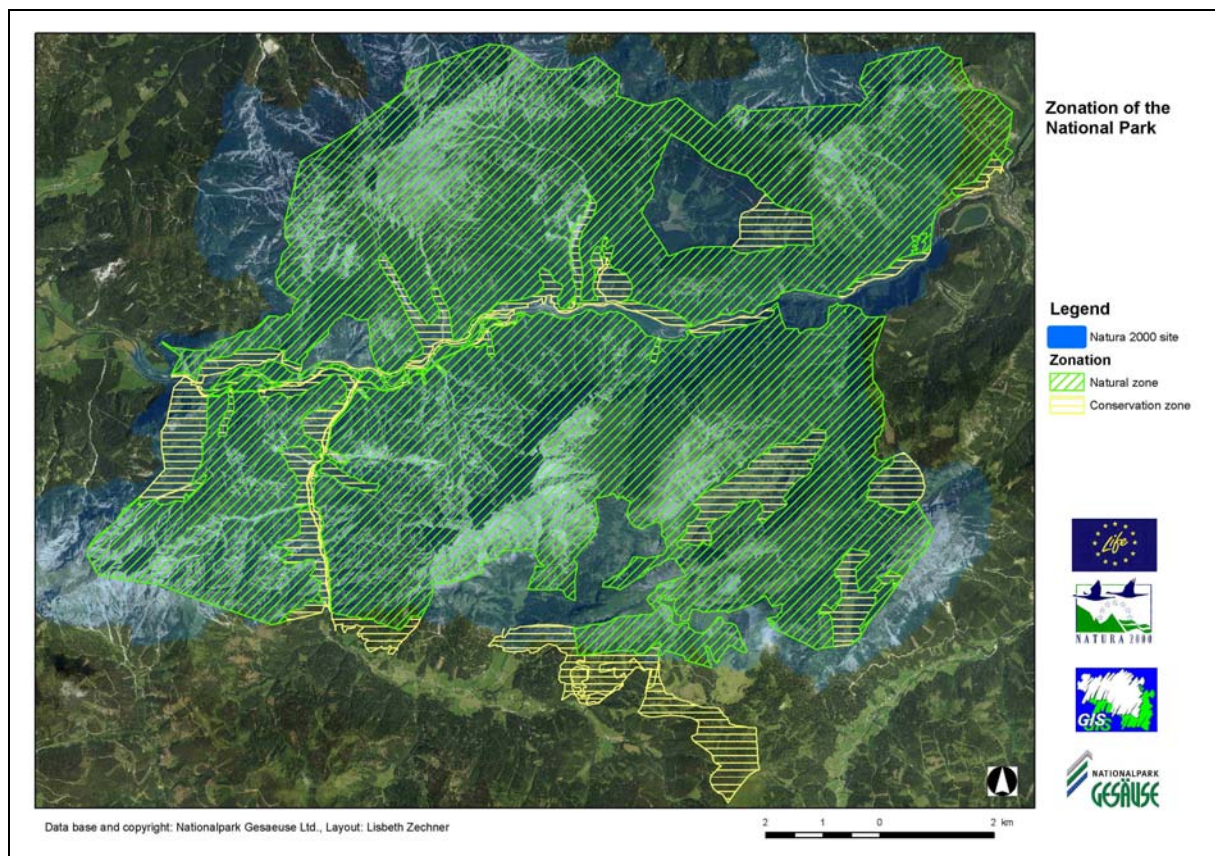


Figure 3. Natura 2000 site and zonation of the National Park.

3.2 Relief and geology

The *Gesaeuse* is affected by its high relief energy with differences in altitude of almost 1800 meters and steep slopes, e. g., the north side of the *Planspitze* with more than 90 % slope angle.

The predominant rock type in the *Gesaeuse* mountains is the *Dachstein* limestone, which the *Hochtor* group's astonishing range of walls as well as those of the *Buchstein's*, are built from. The base of the great mountain walls is mostly composed of the brittle *Wetterstein* dolomite. Due to the dolomite's deep fissures, weathering is intense, which produces bizarre rock formations. From the hydrogeological point of view carst with its caves and springs is dominant.

In the south, however, we see the abrupt transition from the bright limestone walls into the gentle, densely wooded hilltops of the greywacke zone, consisting of slate and quartz much older (www.nationalpark.co.at).

3.3 Climate

The whole area of the Northern Limestone Alps is part of the northern 'stacking area', which means that clouds coming from the north pile up on the mountain range. As a result the humid air masses cool down and condensate.

Consequently, the weather consists of relatively frequent and sometimes continuous periods of precipitation amounting to considerable totals from 1,200 up to more than 2,500 mm per annum. The quantity of precipitation increases with sea level. The wettest season is summer (WAKONIGG 1978).

3.4 Habitats, plants and animals

Water, woodland, alpine pastures and meadows, as well as rock habitats are the formative elements of the *Gesaeuse* National Park (www.nationalpark.co.at). The high variability of substrate and soil is the reason for an enormous spectrum of biotopes and vegetation types (GREIMLER 1992-1993, HOFFERT & ANFANG 2006). Together with the high altitudinal difference within a small area a degree of high biodiversity has been established.

The river *Enns* represents the backbone of the National Park, although together with other waterbodies it covers only 0.6 % of the National Park's area.

The *Enns* in the *Gesaeuse* is one of the last remnants of unspoilt rivers in the Eastern Alps. The lowland forests and the gravel banks alongside the river offer habitats particularly worth preserving. On the banks, for example, the endangered common sandpiper (*Actitis hypoleucos*) builds its nests, and pionier vegetation with the small reed species *Calamagrostis pseudophragmites* and different willow species covers small patches. The gravel banks are inhabited by a diversity of ground beetles, which are adapted to this high dynamic habitat. Above all it is the grayling (*Thymallus thymallus*) and the brown trout (*Salmo trutta* f. *fario*), which dominate this section of the river. Furthermore, the

Ukrainian river lamprey (*Eudontomyzon mariae*) can be found in the Gesaeuse and the varione (*Leuciscus souffia agassizi*) is supposed to be reintroduced during the ongoing LIFE-project (2005-2010).

Forests cover about 50 % of the area. In addition, bush woodland with dwarf-pine (*Pinus mugo*) covers 15 %. The woodlands in the Gesaeuse National Park are characterised by their unspoilt naturalness and by their variety. From the lowland forests along the Enns to the larch woods (*Larix decidua*) and Swiss stone pines (*Pinus cembra*) on the Zinoedl, from the gorge woods in the *Hartelsgraben* to woods of Dolomite scots pines (*Pinus sylvestris*) in the *Johnsbach* valley, one finds an array of highly distinctive kinds of woodland. A high proportion of the more than 45 known types of montane spruce-fir-beech-forests are natural with a high portion of dead wood (THUM 1980, GREIMLER 1993, KROIHER 1999, CARLI 2007). Besides a high variety of birds (woodpeckers, owls, grouses, etc.), the forests harbour a high biodiversity of lichens, mushrooms, bats and beetles, etc. (SPITZENBERGER 2004, MAIRHUBER 2005, WILFLING & KOMPOSCH 2006, PYSARCZUK et al. 2006, ADLBAUER 2006).

Locations without woodland due to the relief are covered with alpine and subalpine calcareous grasslands, as well as calcareous and calcshist scree of the montane to alpine levels. Alpine meadows and pastures cover 5.1 % of the National Park. These habitats harbour a diversity of invertebrate fauna (HABELER 2007, FRIEB & DERBUCH 2005, FRIEB et al. 2006a, b, c, d). Wide areas of peaks and slope are sparsely covered by vegetation. All together 31.4 % of the National Park area is covered with rocks and stones. The calcareous rocky slopes are mainly covered with the typical chasmophytic vegetation such as *Clusius-cinquefoil*.

4 METHODS

4.1 Visitor Experience and Resource Protection Framework

The visitor management concept is mainly based on the VERP - Visitor Experience and Resource Protection Framework - principles currently used in many US National Parks, but was adapted to the needs of the National Park Gesaeuse, considering the legal situation of the protected area, as well as the resource and tourist background. In addition, the Natura 2000 standards have to be included. On this behalf the risk analysis concept for Natura 2000 species and habitats of PROEBSTL et al. (2007) was adapted.

The VERP framework was developed by the U.S. National Park Service in 1997. It is a process which deals with the carrying capacity concerning the natural resources and the quality of visitor experience. It contains standards for desired future conditions of resource and tourism and defines which intensities of use are appropriate where, when and why. Nine elements are integral to the VERP framework. While the scope of the elements, the order in which they are undertaken, and the specific methods used to complete the elements may vary in different situations, all of the elements are necessary to implement a VERP programme. The implementation of the concept is done by the means of an adaptive management (POMEROY et al. 2004, LIME et al. 2004, HOCKINGS et al. 2000). The framework includes the following steps (Figure 4):

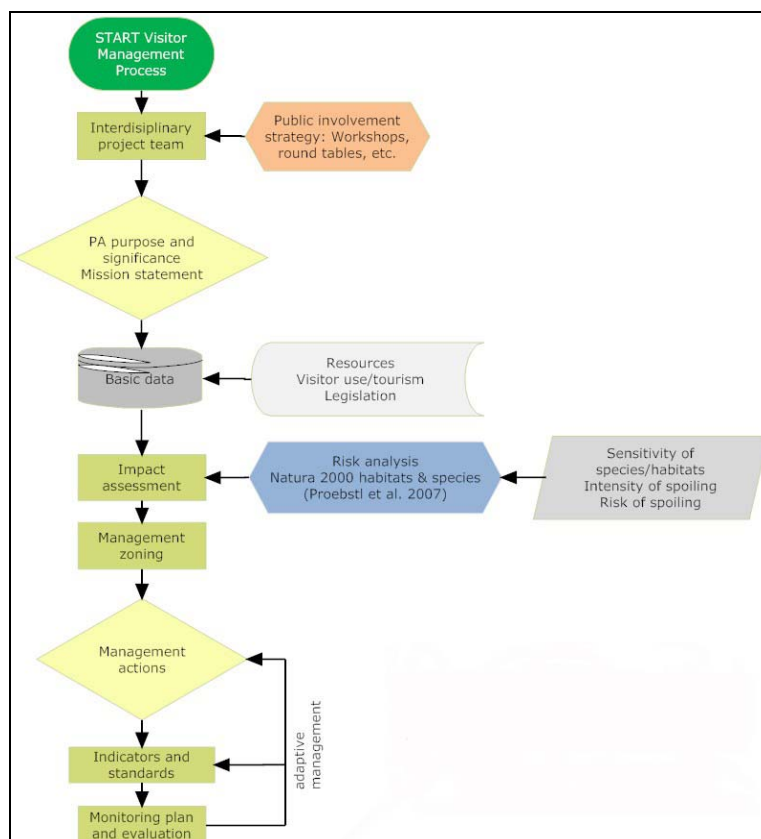


Figure 4. Flowchart with the steps of the visitor management concept.

4.1.1 Interdisciplinary project team

A core team is needed and should include those people able to develop the plan and those who will implement the plan. A wide variety of consultants with various backgrounds and expertise may be needed to assist the core team (U. S. DEPARTMENT OF INTERIOR – NATIONAL PARK SERVICE 1997).

The core team includes the employees of the National Park Gesaeuse Ltd. and the head of the department of wildlife and forest management, as well as one professional hunter of the National Park.

Altogether three workshops with the core team were held in January and July 2007. In addition, meetings in order to optimize the ranger service and the ski mountaineering concept were held. There were also meetings with the members of the mountain rescue service for canyoning and with all four professional hunters of the National Park.

Furthermore, different experts were involved to estimate the conservation status of Natura 2000 habitats and species, other sensitive species as well as the impact of tourism on protected and sensitive species:

Fish: Mathias Jungwirth, Guenther Unfer, Christian Wiesner (University of Natural Resources and Applied Life Sciences, Vienna), Udo Grollitsch

Bats: Simone Pysarczuk (KFFOE)

Caves not open to the public: Eckhart Herrmann, Guenter Stummer (OEHV und Natural History Museum Vienna)

Otter: Andreas Kranz (Styrian Hunters' Organisation)

Vegetation and plants: Daniel Kreiner (National Park Gesaeuse Ltd.)

Marmot: Isabel Schmotzer

Visitors: Petra Sterl, Lisbeth Zechner

The ski mountaineering concept was worked out from 2004 – 2006 under the direction of Karoline Scheb, National Park Gesaeuse Ltd. It is part of this management plan.

4.1.2 Park purpose and significance

Statements on park purpose and significance form the foundation upon which the VERP plan and implementation strategies are built. All subsequent elements must be consistent with and supportive of these statements (U. S. DEPARTMENT OF INTERIOR – NATIONAL PARK SERVICE 1997). The importance of establishing clear, measurable, outcome-based objectives as a basis for management cannot be stressed too much (HOCKINGS et al. 2000). Management objectives/desired conditions and associated indicators and standards should be formulated on the basis of several considerations. In keeping with the three-dimensional model of carrying capacity, these considerations can be organised into three broad categories resource, experiential and managerial (MANNING 2007).

Goals and objectives for the visitor management in the National Park Gesaeuse are determined in general by the legal situation, but have to be adapted according to the various aspects of management.

4.1.3 Basic data on legislation, tourism and resources

The objective of this step is to understand as fully as possible park resources and existing visitor use and experience. This analysis should be documented, usually by using a combination of maps, matrices, and text (U. S. DEPARTMENT OF INTERIOR – NATIONAL PARK SERVICE 1997).

Data on tourism come from SCHEB (2002), from the local communities of Weng and *Johnsbach*, from the operator of the *Hesshuetten* (Reinhard Reichenfelser), from the website of the local government of Styria (www.stmk.gv.at), from Michael Getzner, University of Klagenfurt, from my colleague Isabella Mitterboeck, National Park Gesaeuse Ltd., as well as from Sylvia Hofbauer and Irmgard Gruber of the tourism association 'Alpenregion Nationalpark Gesaeuse'.

In addition, the records in different summit logs were counted to estimate the number of visitors on peaks in the National Park.

Data on resources come from the Natura 2000 standard data form and from all available studies and reports on research done during the last years in the National Park Gesaeuse, i.e. CARLI 2007, GLATZ et al. 2007, GREIMLER 1991, GRUENSCHACHNER-BERGER & PFEIFER 2005, 2006, HAMMER 2006, HOFFERT & ANFANG 2006, HOELSCHER 2005, HAUBENWALLNER 2006, HERRMANN & STUMMER 2007, JUNGWIRTH et al. 1996, KAMMERER 2003a, b, 2005, 2006a, b, KRANZ 2006, 2007a, b, MAIRHUBER 2005, PAILL 2005, PRENNER 2005, PYSARCZUK 2007, PYSARCZUK et al. 2006, SCHMOTZER 2007, SPITZENBERGER 2004, THUM 1980, WIESNER et al. 2006, ZECHNER 2003, 2007a. Furthermore experts were involved to actualise the data (see above).

All available data were digitised into digital data and analysed with a GIS (Arc Map 9). The list of GIS-data is found in the Annex, 16.2 Available GIS-data (July 2007).

Because of lacking data – mainly on tourism - this concept follows the VERP-framework only partly and may be taken as a draft, which should be completed after the collection of detailed data.

4.1.4 Description of the visitor use in the National Park

The following step includes the description of current, planned and potential visitor activities broken down to the main summer and winter activities in the Gesaeuse, which may include different kinds of visitor experience.

4.1.5 Impact assessment and risk analysis

Afterwards an impact assessment of visitor use on sensitive habitats and species was done. For the Natura 2000 habitats and species, as well as other sensitive habitats and species a risk analysis was made according to PROEBSTL et al. (2007) (cp. 4.2 Risk analysis for Natura 2000 habitats and species).

4.1.6 Management zones and areas of conflict

Taking into consideration the main activities, experiences provided and visitor programmes, different management zones were identified and areas of conflict were defined.

This zonation provides a basis for analysing the impact of different visitors' activities and focuses on different intensities of use. It is important to consider future conditions in the National Park.

The qualitative description of the different zones comprises:

- ◆ Boundaries of the zone
- ◆ Natural resources
- ◆ Accessibility and touristy activities
- ◆ Quality of visitor experience
- ◆ Use intensity
- ◆ Management activities and infrastructure
- ◆ Potential for development
- ◆ Objectives and purposes of management

4.1.7 Indicators and standards for each zone

The selection of indicators plays a crucial role for the quality of management (ERKKONEN & ITKONEN 2006). Indicators are defined as specific, measurable physical, ecological, or social variables that reflect the overall condition of a zone. Resource indicators measure visitor impacts on the biological, physical, and/or cultural resources of a park. Social indicators measure visitor impacts on the visitor experience. There are eight characteristics that define good indicators (U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE 1997, HOCKINGS et al. 2000, LIME et al. 2004, MANNING 2007):

- ◆ specific
- ◆ objective
- ◆ reliable and repeatable
- ◆ related to visitor use
- ◆ sensitive
- ◆ resilience

- ◆ non-destructive
- ◆ significant

The selection of the indicators is done by following criteria (U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE 1997):

- ◆ easy to measure
- ◆ easy to train for monitoring
- ◆ cost-effective
- ◆ minimal variability
- ◆ response over a range of conditions
- ◆ large sampling window
- ◆ availability of baseline data

Examples for social and resource indicators are given for instance in SHELBY & HEBERLEIN (1986), LIME et al. (2004), and MANNING (2007).

Standards are the base for the evaluation of management measures (HOCKINGS et al. 2000). They are defined as the minimum acceptable condition for each indicator variable (cp. U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE 1997, LIME et al. 2004). When monitoring indicates that social or resource conditions are out of standard or are deteriorating toward a standard, management action must be taken (U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE 1997).

Standards for resource indicators are supposed to secure the favourable conservation status of sensitive and endangered habitats and species. For the Natura 2000 habitats and species the conservation status at the time of designation of the Natura 2000 site can serve as standard. Social standards should secure a high quality visitor experience.

Good standards meet the following criteria (U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE 1997):

- quantitative
- time or space-bound
- expressed as a probability
- impact-oriented (direct focus on impacts that affect the quality of park resources and visitor experience)
- realistic

This concept includes only first suggestions for indicators and standards, because of lacking data. They will be worked out within a participatory process.

4.1.8 Management actions

One of the last steps of the VERP process is the elaboration of management actions to minimize the negative impact of visitor use on protected habitats and species, as well as to guarantee visitors' experience to a large degree. There are different management strategies to regulate visitor use (cp. U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE 1997, WESSELY 2001, EAGLES et al. 2002, LIME et al. 2004, WOLF & APPEL-KUMMER 2004, INGOLD 2005, GEORGII & ELMAUER 2002, LIECHTI et al. 2006).

The VERP handbook (U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE 1997) identifies five general management strategies that managers can use to address recreational use impacts

- increase the supply of recreational opportunities, areas, and facilities to accommodate increased demand
- reduce public use at specific sites, in individual management zones, or throughout the park
- modify the character of visitor use by controlling where the use occurs, when the use occurs, what type of use occurs, or how visitors behave
- alter visitor attitudes and expectations
- modify the resource base by increasing the durability of the resource or by maintaining or rehabilitating the resource

In the five strategies, there are many specific management actions or tactics that can be used. These tactics fall into five general categories:

- site management (e.g., facility design, the use of vegetation barriers, site hardening, area/facility closure)
- rationing and allocation (e.g., reservations, queuing, lotteries, eligibility requirements, pricing)
- regulation (e.g., the number of people/stock, the location or time of visits, activity, visitor behaviour, or equipment)
- deterrence and enforcement (e.g., signs, sanctions, personnel)
- visitor education (e.g., promote appropriate behaviour, encourage/discourage certain types of use, provide information regarding use conditions)

Within this concept a deadline for the implementation of the different management activities has been determined.

4.1.9 Monitoring of resource and social indicators

Evaluation is the basis for the adaption and improvement of management measures (cp. HOCKINGS et al. 2000, GEORGII & ELMAUER 2002). Main contents of the control of success (control of management measures, purposes and effectiveness) are found in GEORGII & ELMAUER (2002).

The monitoring of indicators concerning tourism includes surveys of visitors and interviews of visitors on crowding, satisfaction with outdoor recreation quality as well as satisfaction with the programme of the National Park. Periodic visitor surveys may be able to show which areas are used and which are necessary for an effective visitor management (RAMMO et al. 2006, MARWIJK & LENGKEEK 2006).

The monitoring plan has to be feasible and objective and has to be implemented within the right time. According to the U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE (1997) monitoring is necessary, where

- conditions are at or in violation of standard
- conditions are changing rapidly
- specific and important values are threatened by visitation
- the effects of management action are unknown

Within this concept a draft of the monitoring plan for resource and social indicators was elaborated. It shows where, when and how selected indicators are going to be monitored and gives priorities (1 high – 3 low) for the different monitoring actions.

4.2 Risk analysis for Natura 2000 habitats and species

The risk analysis was conducted according to PROEBSTL et al. (2007) by consulting different experts. It tries to assess the impacts of tourist use on protected habitats and species. In order to determine the status of conservation, the intensity of use is correlated with the intensity of spoiling.

The sensitivity of priority natural habitat types and/or priority species depends on the conservation status and the relevance of touristy activities (Table 2). The relevance is estimated in determined by three categories on the temporal or spatial overlapping of leisure activities with priority natural habitat types and/or priority species. Additional factors for deterioration are taken into consideration, e. g., off-leashed dogs in breeding habitats of ground-breeding birds.

Sensitivity		Conservation status		
		A	B	C
Relevance of touristy activity	0	0	0	0
	1	0	1	2
	2	1	2	3
	3	2	3	3

Table 2. Matrix for estimation of sensitivity of habitat types and species.

The intensity of spoiling depends on the intensity of use and the efficiency of management measures (Table 3). Due to visitor management measures the intensity of spoiling may be low even at a high intensity of use.

Intensity of spoiling		Efficiency of management measures		
		0/1	2	3
Intensity of use	0	0	0	0
	1	0	1	2
	2	1	2	3
	3	2	3	3

Table 3. Matrix for estimation of intensity of spoiling.

The risk of spoiling depends on the sensitivity and intensity of spoiling and is estimated in the three categories low, moderate and high (Table 4). Need for action within the visitor management is given at moderate and mainly at high risk.

Risk of spoiling		Intensity of spoiling		
		1	2	3
Sensitivity	0	0	0	0
	1	0	1	2
	2	1	2	3
	3	2	3	3

Table 4. Matrix for estimation of risk of spoiling.

Priority natural habitat types and priority species and their conservation status were defined by experts according to ELLMAUER (2005 a, b, c) or were taken from the Natura 2000 standard data form.

The analysis of potential spatial overlapping of touristy use and distribution of sensitive habitat types and species was done with a geographic information system (ArcMap 9.0).

5 OBJECTIVES AND PURPOSE OF VISITOR MANAGEMENT

Beside the preservation and conservation of this virgin landscape, the National Park is legally obligated to implement environmental education. It also tries to enforce traditional, non-exploitative forms of tourism. High priority has the sensitisation of visitors for nature, protection of nature and the idea of the National Parks.

The Gesaeuse National Park aims to become an outstanding, high-profile example for nature and environmental education programmes. This is done by a team of highly motivated and trained National Park rangers, attractive nature trails and through a diverse programme of guided tours and lectures on different topics and suitable for groups of all ages (www.nationalpark.co.at).

Within the visitor management concept § 2 of the National Park law and the standards for Natura 2000 sites have to be considered.

5.1 Conservation of the typical animals and plants of the region

The conservation of natural landscape with its characteristic plants and animals includes the following aspects:

- ◆ no damage, disturbance or removal of plants and animals
- ◆ no damage or disturbance of endangered or sensitive species and habitats
- ◆ protection of undisturbed areas for wildlife
- ◆ no interference of wild animals in their migrations and or in different parts of their habitats by tourists
- ◆ No limitation of the time budget for essential activities of wild animals by tourists
- ◆ No reduction of the energy reserves of wildlife due to flight reactions caused by outdoor activities of tourists

5.2 Maintenance of a favourable conservation status of Natura 2000 habitats and species

Main goal of the Habitats' Directive is the maintenance or restoration the favourable conservation status of a natural habitat type in Annex I, of a species in Annex II of the Habitats' Directive (article 2) or in Annex I of the Birds' Directive. The Habitats' Directive gives the definition of 'favourable conservation status'. Recommendations for the evaluation of the conservation status in Austria including indicators and standards are meanwhile available (ELLMAUER 2005a, b, c; www.umweltbundesamt.at/umweltschutz/naturschutz/natura_2000/gez/).

5.3 Visitor experience for recreation and educational aims

Recreation activities should happen in accordance with nature. In the National Park this means the protection of the ecological diversity and the continuing development of the understanding of natural processes (GEORGII & ELMAUER 2002). Tourists should respect the rules for a 'peaceful' coexistence of recreation activities and protection of wildlife.

Also, the tourism marketing takes into consideration the ecological value of the area. The quality of visitor experience and recreation should be increased by attractive offers and programmes on nature and environmental topics. The possibility for observation of certain species is one of the main highlights of National Park.

6 BASIC DATA ON LEGISLATION, TOURISM AND RESOURCES

6.1 Legislation

Regulations and laws are summarized in the annex (16.1 Legal basis). The most important regulations which affect the visitor management include the Navigation Regulation, the Law on the permission of cross-country walking in mountainous areas *Wegefreiheit im Bergland* and the prohibition to enter river banks and wetland areas within the National Park, except marked areas (RIEMLMOSER & MUELLER 2003).

6.2 Tourism and tourism infrastructure

6.2.1 National Park and region

People of the region follow the tourism activities of the National Park Gesaeuse Ltd. with more or less great interest, but these activities are seen mainly as offers for tourists. They are judged favourably, but some innovative projects, i. e. willow dome and pavilion evoke different reactions. Reactions vary also within one sector (politics, tourism, agriculture, etc.). One reason for this may be the different involvement of diverse stakeholders. Politicians welcome sustainable tourism projects of the National Park Gesaeuse Ltd., but most of them think that dedication should be enforced (KLAPF 2005).

Currently, communities compete with each other. By more social dedication the National Park may function as connector/connecting link. Sustainable tourism which brings economic and social benefit to the region may be a chance to increase acceptance of the National Park in the region (KLAPF 2005).

6.2.2 Tourism association 'Alpenregion Nationalpark Gesaeuse'

On the one hand, tourism plays a major role for income in the region (KLAPF 2005), because of the untouched natural and the cultural landscape, the National Park and the Nature Park '*Eisenwurzen*', as well as other tourist destinations like the monastery of *Admont* or events like the music festival in *St. Gallen*. On the other hand the region is not well known and it still lacks the possibility of activities throughout the year and high-quality hotels.

Tourism plays a crucial part in the development of a new mission for the LEADER+ region '*Eisenwurzen-Gesaeuse*', which includes 12 communities (cp. GFA GMBH & HUSAK CONSULTING 2006). The National Park is seen as a big chance for the regional development of tourism by many stakeholders. Infrastructure and programmes of the National Park should enhance the development of tourism (BAUMS 2005). First studies on the acceptance of the National Park in the region and on the potential for tourism development were done by KLAPF (2005) and ZWARNIG (2006).

The National Park Ltd. is member of the tourism association '*Alpenregion Nationalpark Gesaeuse*', which was founded 2006 according to the law of tourism 1992 § 4 (3). It includes 12 communities (*Admont, Altenmarkt, Arding, Gams, Hall, Hieflau, Johnsbach, Landl, Palfau, St. Gallen, Weißenbach/Enns* and *Weng/Gesaeuse* (Irmgard Gruber, in litt.).

Tasks and organisational structures of this tourism association are outlined in BAUMS (2005). The association has one office in *Admont* and one in *St. Gallen*.

6.2.3 Number of beds and overnight stays

The number of beds in the six National Park communities decreased from 1950 beds in the year 1990 to 1350 beds in 1995. After a light increase the number was quite stable with 1570 to 1580 beds. From 2002 to 2005 another decline was observed. But in 2006 the number of beds increased obviously (cp. Figure 5)

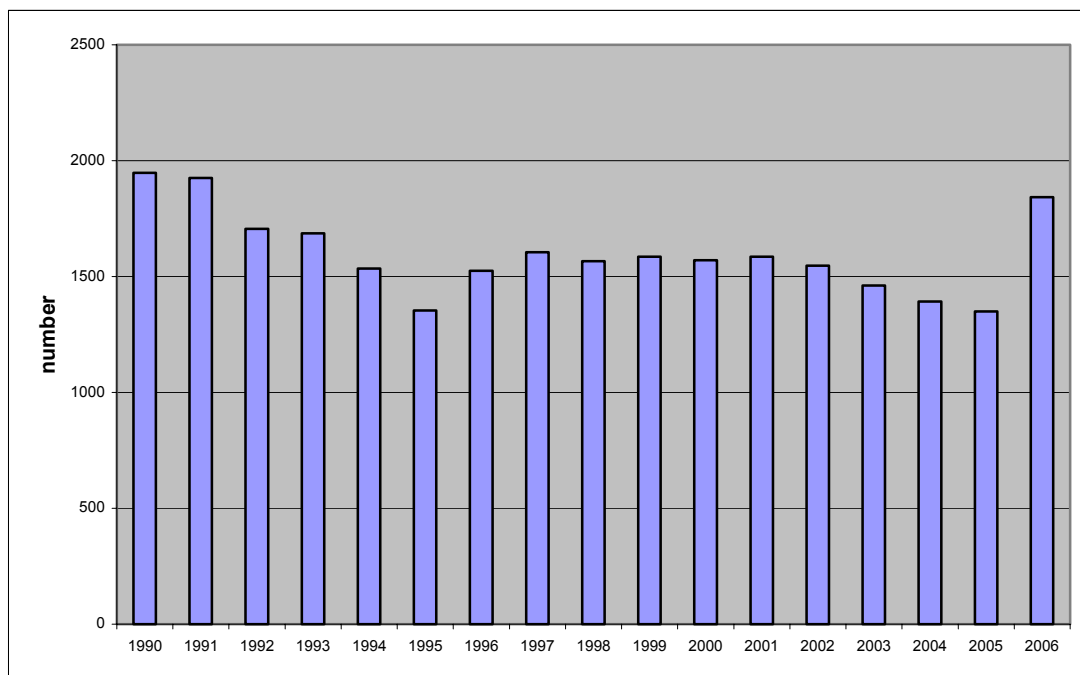


Figure 5. Number of beds during summer season in the six National Park communities.

In *Johnsbach, St. Gallen, Weng* and *Hieflau* the number of overnight stays was more or less stable from 1991 to 2006, whereas in the community of *Landl* clear deviations and in *Admont* a marked decline from 50.000 in 1991 to 30.000 in 2004 could be observed. However, during the last two years the number of overnight stays in *Admont* increased obviously (2005 about 31.150, 2006 about 35.500). The increase can probably not be related to the activities of the National Park Gesaeuse, but is rather due to the overnight stays of additional workers needed in construction (power station and streets) in the area of *Hieflau* (I. Mitterboeck, in litt.).

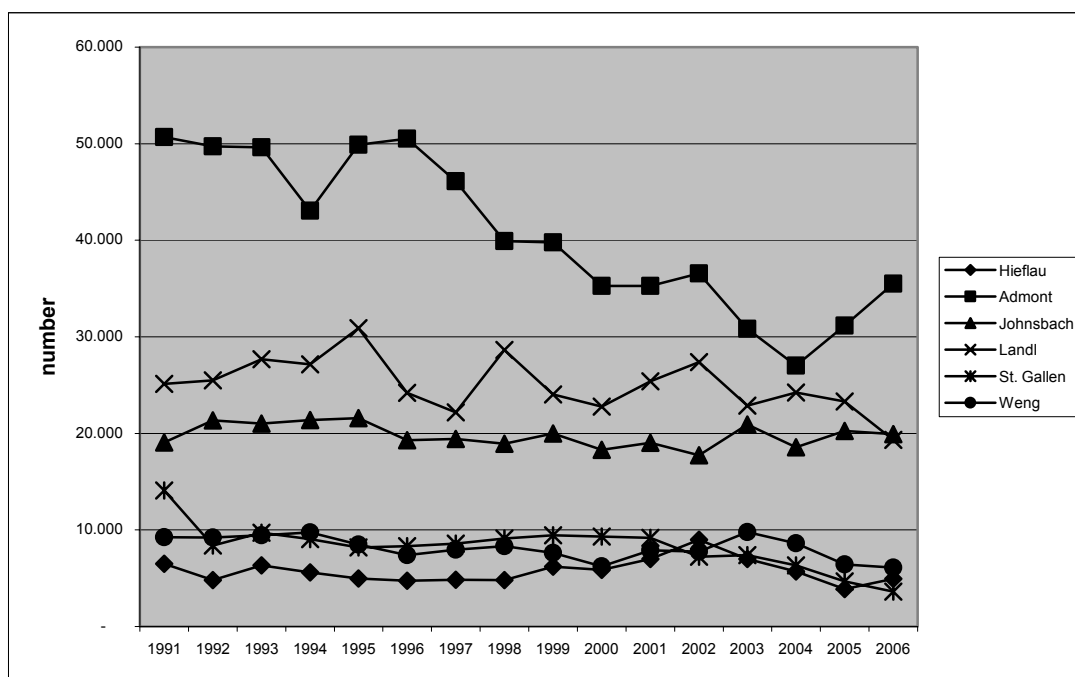


Figure 6. Number of overnight stays per year in the six National Park communities.

6.2.4 Refuges

Four refuges and one self-supplier hut (Goferhuetten) can be found in the National Park planning area.

Name	Location	Year of construction	Supply	Number of overnight stays
<i>Buchsteinhaus</i>	<i>Großer Buchstein, 1571 m asl.</i>	1921-24	Material cable railway	1996-2006: 765 on average, maximum 2001: 1202
<i>Ennstaler Huette</i>	<i>Tamischbach-turm, 1544 m asl.</i>	1885	Material cable railway	1996-2006: 850 on average, maximum 2003: 1179
<i>Haindlkarhuette</i>	<i>Haindlkar, 1121 m asl.</i>	1923	Material cable railway	
<i>Hesshuette</i>	<i>Hochtor, 1699 m asl.</i>	1893	helicopter	2003-2006: 4293 on average, maximum 2003: 4885

Table 5. Data on refuges in the National Park Gesäuse.

The number of overnight stays in refuges depends very strongly on the weather and the leaseholders. In 2003 all refuges had a maximum of overnight stays because of the stable and sunny weather conditions.

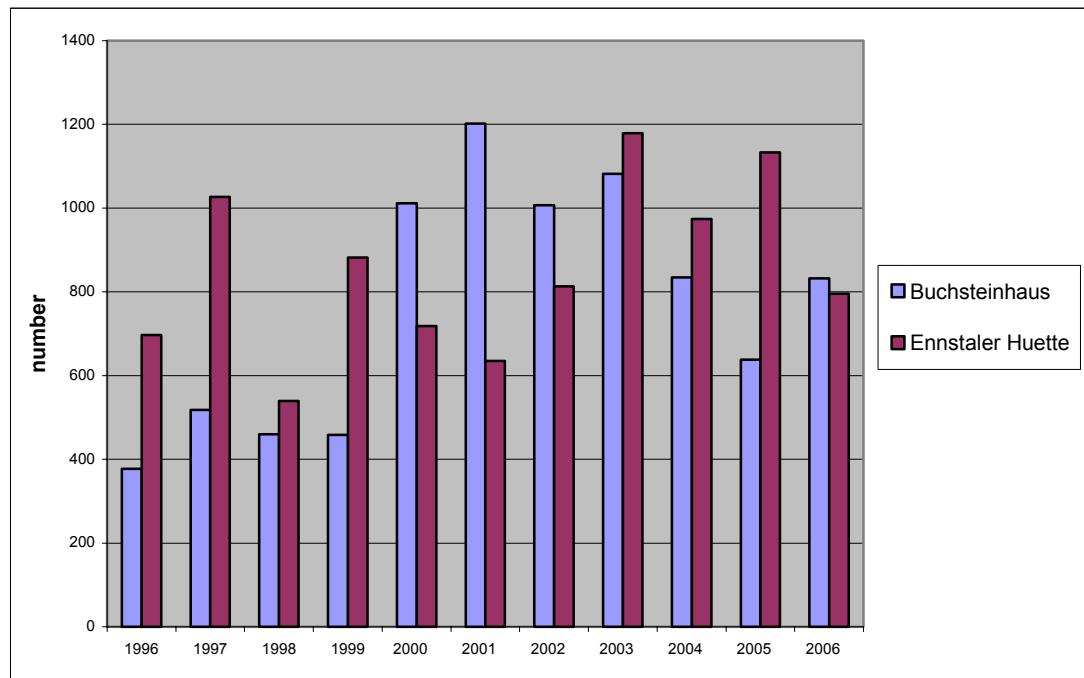


Figure 7. Number of overnight stays per year in the Buchsteinhaus and Ennstaler Huette.

6.2.5 Landesforste-huts

The Styrian Provincial Forestry Commission (*Steiermaerkische Landesforste*) owns about 30 huts in the National Park planning area. On the one hand, the huts are used for wildlife management, on the other hand, they are going to be leased during single weekends (A. Holzinger, oral information).

The following huts are leased with full-year contracts or are going to be leased for single weekends:

- ◆ hut *Hochscheibe*
- ◆ hunting-lodge *Hochscheibe* (full-year leased)
- ◆ hunting-lodge *Eggeralm*
- ◆ hunting-lodge *Untere Koderalm*
- ◆ *Gschwantner*-hut *Hartelsgraben* (full-year leased)
- ◆ hunting-lodge *Neuburgalm*
- ◆ hut *Pfarraalm* (full-year leased)
- ◆ hunting-lodge *Sulzkar*
- ◆ hunting-lodge *Hartelsgraben*

6.2.6 Alp huts

Also, most of the alp huts are owned by the Styrian Provincial Forestry Commission (*Steiermaerkische Landesforste*), except of the private 'Koelblalm'. During summer season many huts are opened and serve some drinks and snacks, i. e. *Kroissenalm*, *Sulzkaralm*, *Jagerhofer Alm*, *Koelblalm*, *Ebneralm*, and

Huberalm. In this context, quite a high motor traffic can be observed to the *Koelbl-* and *Ebneralm*, which touches the fringe area of the National Park. A contract between the owner of the *Koelblalm* and the National Park's management allows everyone to use the supplementary roads in accordance to the National Park's aims(!).

6.2.7 Road network

The National Park is crossed by a public road going from *Admont* in the west to *Hieflau* in the east (B 146). The daily number of cars within 24 hours (DTV = KFZ/24 h) comes to 1,100 (7 – 9 % trucks). Another road in the National Park goes to *Johnsbach* in the south (L 743). It has a traffic load of 800 or 300 vehicles per 24 hours, with 18 or 14 % trucks, respectively ([gis2.stmk.gv.at/da3/\(54j51kqn30g0fe55e1ayi3ap\)/init.aspx?kartensammlung=verkehr&Karte=verkehrsbelastung&Massstab=1200000](http://gis2.stmk.gv.at/da3/(54j51kqn30g0fe55e1ayi3ap)/init.aspx?kartensammlung=verkehr&Karte=verkehrsbelastung&Massstab=1200000)).

6.2.8 Logging-roads

The logging-road network covers about 122 km(!) in the National Park. Parts of it are marked and serve as hiking trails, too. The roads are mainly used for the National Park management, i. e. forestry, wildlife and alpine pasture management, and for the supply of the refuges. Additional drives are done for scientific work and for the National Park programme (excursions). The roads are closed by gates and the use is limited to people having a permission.

Within the LIFE-project (2005-2010) the renaturation of only 1.7 km of forestry-roads will be conducted, but short- to medium-term, all forestry-roads, which are not needed for the management will be renaturated.

6.2.9 Parking places

Parking places are an essential part of tourism management in the National Park, because the main part of the visitors comes in their private cars. Table 6 gives an overview of all official parking places in the National Park.

Name	Number of parking places	Equipment	Starting points
Inn <i>Bachbruecke</i>	24 PKW	Infopoint with 8 boards	Willow dome, <i>Sagenweg</i> , <i>Haendlkarhuetten</i>
<i>Johnsbachsteg</i>	8 PKW	Infopoint with 4 boards, 2 tables, 4 benches	<i>Rauchboden</i> trail, Willow dome, <i>Buchstein</i> , railway station Rafting entry/exit site
<i>Haendlkar</i> south	20 PKW	Infopoint with 4 boards, 2 tables, 4 benches	<i>Haendlkarhuetten</i> , <i>Peterpfad</i> , climbing routes

Name	Number of parking places	Equipment	Starting points
<i>Wegmacher</i>	20 PKW	Infopoint with 2 boards,	Climbing routes <i>Planspitze</i> and <i>Peternschartenkopf</i> , Camping and open fire place ' <i>Forstgarten</i> ', visitor area <i>Gstatterboden</i>
Pavilion <i>Gstatterboden</i>	80 PKW	Infopoint with 8 boards, 1 Infopoint with 1 board	Pavilion <i>Gstatterboden</i> , <i>Buchsteinhaus</i> , Ennstaler Huette, <i>Rauchboden</i> trail, mountainbiketour <i>Hochscheibe</i>
<i>Kummerbruecke</i>	25 PKW	Infopoint with 4 boards, 3 tables, 6 benches	<i>Wasserfallweg Hesshuette</i>
<i>Lend Hieflau</i>	17 PKW	Infopoint with 4 boards, 1 table, 2 benches	mountainbiketour <i>Hochscheibe</i> , <i>Tamischbachturm</i>

Table 6. Official parking places with equipment and starting points in the National Park (A. Hollinger).

6.2.10 Public transports

The railway line goes along the Enns. Five stops are to be found within the area: *Gesaeuseeingang*, *Johnsbach*, *Gstatterboden*, *Kummerbruecke* and *Hieflau*.

The rail connection is mainly used for the transport of goods, whereas the passenger traffic is not forced any more (SCHEB 2002). On weekdays one direct bus and six train connexions are available between *Admont* and *Hieflau* and vice versa. On Sunday three trains go in both directions.

6.2.11 Project 'Xeismobil'

Xeismobil is a traffic project of 16 communities in the National Park region which is financed by EU funds and tries to support and improve public transportation.

Sustainability and creating awareness for public traffic, soft mobility and car-free tourism are the most important goals of the project and its marketing activities (www.xeismobil.at).

The aim of the Xeismobil 'bus-on-demand' is the maintenance of public traffic in areas, where regular services are impossible. Where public traffic could not break even, Xeismobil 'bus-on-demand' routes had been established. This bus is used exclusively on request and operates on demand only. The registration is done by phone, at least one hour before the departure. Only about 500 passengers used the 'bus-on-demand' in the National Park area from May 2005 to April 2006.

In addition, the tourism offices in *Eisenerz*, *Admont*, *St. Gallen* and *Wildalpen* were upgraded to mobility centres and linked to the mobility centre in Graz.

Besides inter-modal transport information services like timetables and ticket sales, the core business of the mobility centres is the client's consultation. Further administrative services are offered, e. g., arrangements of car rental or car sharing, selling of accessories (e. g., maps) and the disposition of information on flexible transport services, like the *Xeismobil* (W. Huber, in litt.).

6.3 Resources (sensitive habitats and species)

The selection of habitats and species follows the Natura 2000 standard data form, the decree for the European Protected Area Number 17 '*Ennstaler Alpen/Gesaeuse*', 2.10.06, and the list of habitats and species in the LIFE proposal. The status of conservation was taken from these documents or was improved according to ELLMAUER (2005a, b, c).

In addition to the Natura 2000 habitats and species, characteristic species for the region, e. g., grayling, red and roe deer, chamois and marmot, as well as sensitive and/or endangered species, i. e. common sandpiper, were taken into account.

6.3.1 Natural habitats of Annex I (Habitats' Directive)

Table 7 shows the habitats of Annex I, which are found in the Gesaeuse:

Habitats of Annex I (Habitats' Directive)	Status of conservation
3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition – type vegetation	B
3220 Alpine rivers and the herbaceous vegetation along their banks	B
3240 Alpine rivers and their ligneous vegetation with <i>Salix elaeagnos</i>	B
3270 Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidens</i> p.p. vegetation	B
4060 Alpine and Boreal heaths	A
4070 * Bushes with <i>Pinus mugo</i> and <i>Rhododendron hirsutum</i> (<i>Mugo-Rhododendretum hirsuti</i>)	A
6170 Alpine and subalpine calcareous grasslands	A
6230 * Species-rich <i>Nardus</i> grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	B
6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	A
6520 Mountain hay meadows	B
7140 Transition mires and quaking bogs	C?
7220 * Petrifying springs with tufa formation (<i>Cratoneurion</i>)	A
7230 Alkaline fens	C
8120 Calcareous and calcshist screes of the montane to alpine levels (<i>Thlaspietea rotundifolii</i>)	A-B
8130 Western Mediterranean and thermophilous scree	C
8210 Calcareous rocky slopes with chasmophytic vegetation	A
8240 * Limestone pavements	A

Habitats of Annex I (Habitats' Directive)	Status of conservation
8310 Caves not open to the public	A
9180 * Tilio-Acerion forests of slopes, screes and ravines	A-B
9110 Luzulo-Fagetum beech forests	B
9130 Asperulo-Fagetum beech forests	B-C
9140 Medio-European subalpine beech woods with Acer and Rumex arifolius	A
9150 Medio-European limestone beech forests of the Cephalanthero-Fagion	B-C
91E0 * Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	B-C
91F0 Riparian mixed forests of Quercus robur, Ulmus laevis and Ulmus minor, Fraxinus excelsior or Fraxinus angustifolia, along the great rivers (Ulmenion minoris)	C
9410 Acidophilous Picea forests of the montane to alpine levels (Vaccinio-Piceetea)	B
9420 Alpine Larix decidua and/or Pinus cembra forests	A

Table 7. List of natural habitat types of Annex I (Habitats' Directive) and conservation status in the Natura 2000 site 'Ennstaler Alpen/Gesaeuse'. Conservation status A = excellent, B = good and C = average.

6.3.2 Species of Annex II (Habitats' Directive)

Table 8 shows the species of Annex II, which are found in the Gesaeuse:

Species of Annex II	Status of conservation
1087 Long-horned beetle <i>Rosalia alpina</i>	B
1098 Ukrainian brook lamprey <i>Eudontomyzon mariae</i>	B
1131 Varione <i>Leuciscus souffia</i>	C
1163 European Bullhead <i>Cottus gobio</i>	B
1193 Yellow-bellied toad <i>Bombina variegata</i>	C
1303 Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	C
1308 Western barbastelle <i>Barbastella barbastellus</i>	-
1324 Greater mouse-eared bat <i>Myotis myotis</i>	-
1354 Brown bear <i>Ursus arctos</i>	B
1355 Otter <i>Lutra lutra</i>	C
1381 <i>Dicranum viride</i>	C
1386 <i>Buxbaumia viridis</i>	C
1902 Lady's slipper <i>Cypripedium calceolus</i>	B

Table 8. List of species of Annex II (Habitats' Directive) and conservation status in the Natura 2000 site 'Ennstaler Alpen/Gesaeuse'. Conservation status see Table 7.

The lesser horseshoe bat has a bad status of conservation (C). For the greater mouse-eared bat and the western barbastelle an estimation of the conservation status is not possible because of the lack of data (PYSARCZUK 2007).

Currently, otters are found regularly in the Enns and *Johnsbach*, whereas some years ago they were only migrating into this area. Unfortunately the National Park is too small to apply the criteria of ELLMAUER (2005b) to estimate the status of conservation (A. Kranz, in litt.). According to BODNER (2005) the status of conservation is C because of the small size of most of the Natura 2000 sites, which cannot support a whole population.

6.3.3 Bird species of Annex I (Birds' Directive)

Table 9 shows the birds of Annex I, which are found in the Gesaeuse:

Bird species of Annex I (Birds' Directive)	Status of conservation
A072 Honey bussard <i>Pernis apivorus</i>	-
A081 Rohrweihe <i>Marsh harrier</i>	-
A082 Kornweihe <i>Hen harrier</i>	-
A091 Golden eagle <i>Aquila chrysaetos</i>	B
A094 Osprey <i>Pandion haliaetus</i>	-
A103 Peregrine Falcon <i>Falco peregrinus</i>	B
A104 Hazel grouse <i>Bonasa bonasia</i>	B
A108 Capercaillie <i>Tetrao urogallus</i>	B
A215 Eagle owl <i>Bubo bubo</i>	B
A217 Pygmy owl <i>Glaucidium passerinum</i>	?
A223 Tengmalm's owl <i>Aegolius funereus</i>	?
A234 Grey-headed woodpecker <i>Picus canus</i>	C
A236 Black woodpecker <i>Dryocopus martius</i>	B
A239 White-backed woodpecker <i>Dendrocopos leucotos</i>	B/C
A241 Three-toed woodpecker <i>Picoides tridactylus</i>	B
A320 Red-breasted flycatcher <i>Ficedula parva</i>	
A408 Ptarmigan <i>Lagopus mutus</i>	B
A409 Black grouse <i>Tetrao tetrix</i>	B

Table 9. List of bird species of Annex I (Birds' Directive) and conservation status in the Natura 2000 site 'Ennstaler Alpen/Gesaeuse'. Grey = migrating species. Conservation status see Table 7.

6.3.4 Additional habitats and species

Apart from the Natura 2000 habitats and species the following habitats, species and species groups were taken into consideration, due to their being either characteristic for the region, and/or endangered and/or sensitive to disturbance:

- ◆ 'Speikboeden'
- ◆ Ground beetle
- ◆ Grayling *Thymallus thymallus*
- ◆ Common sandpiper *Actitis hypoleucos*
- ◆ Alpine marmot *Marmota marmota*
- ◆ Deer species (red deer and chamois)

'Speikboeden'

The habitat 'Speikboeden' is build of two plant associations: *Agrostis rupestris*-community and *Salix retusa-Oreochloa disticha*-community. Its name comes from the plant Celtic Spikenard (*Valeriana celtica* ssp. *norica*), with its characteristic smell, which is found normally in silicat. In the Gesaeuse this plant community could be a special relict population (Greimler 1991, D. Kreiner, in litt.).

Ground beetles

Ground beetles are indicators to evaluate the condition of gravel banks along the *Enns* and *Johnsbach* (cp. PAILL 2005).

Grayling *Thymallus thymallus*

The Gesaeuse belongs to the hyporhithral which is dominated by the grayling (*Thymallus thymallus*) (JUNGWIRTH et al. 1996). The most important sections of the *Enns* for spawning include the mouth of the *Gofer* valley (*Gesaeuseeingang* to *Krapfalm*), the mouth of the *Bruckgraben* (*Ritschengraben* – *Krummschnabel*) and the head of the reservoir in *Gstatterboden* (POLLHEIMER n. d., U. Grollitsch, in litt.).

Common sandpiper *Actitis hypoleucos*

The breeding population of the common sandpiper comprises four to five pairs in the Gesaeuse (*Gesaeuseeingang* – *Kummerbruecke*). In addition, sometimes one pair breeds at the *Johnsbach* (ZECHNER 2003, HAMMER 2006). The common sandpiper needs natural river habitats with natural dynamics, gravel banks and shallow water.

Alpine marmot *Marmota marmota*

A survey of marmots was conducted in 2005 in the National Park. Altogether 148 animals in 26 territories were found. The area of distribution is quite small with a diameter of 6.5 km and includes the *Kleiner Oedstein* – *Planspitze* – *Zinoedl* – *Glanegggleiten* – *Untere Stadlfeldalm* (SCHMOTZER 2007).

Deer species

Main summer habitats of red deer are found north of the *Enns* (*Rohr*, *Draxlital*, *Hinterwinkel* and *S Tamischbachturm*). The *Gstatterstein* and the *Aiblloch* are habitats for red deer and chamois. South of the *Enns* the *Wolfbauernhochalm*, the *Troeg* in the *Sulzkar* and the *Huepflingeralm* with *Gsuech* and *Schwarzlacke*

are used. Also, the *Haselkar* plays a role as habitat. Additional important biotopes are found in the *Gofer* (*Haindlmauer – Goferschuett – Langgries – Haindlmuehlwald*) and in the *Neuwegwald*.

By opening of the over wintering enclosure (which is planned in the near future) the animals will be distributed to three major areas (Bock- and *Bauernberg*, *Bauernriedel/Jagatal* and the *Hoerndl* (Ch. Hirsch, H. Kranzer, Ch. Mayer and R. Unterberger, oral information).

Main habitats of chamois are the *Pichlmaierschuett/Bruckgraben*, the *Lugauerplan* as well as the *Scheuchegg* and the *Gsuechmauer*.

7 VISITOR USE IN THE NATIONAL PARK

Data on the number of visitors, visitor characteristics, and crowding on trails in the National Park are not available in detail. Furthermore, information on the motivation of visitors to come to the Gesaeuse, on the quality of visitor experience and on visitor behaviour (e. g., off-trail use, temporal use patterns, spatial use patterns, off-leashed dogs) is still missing. In addition, socio-economical data have to be collected by questionnaires during the next years. For these reasons, only basic data are described within this chapter.

7.1 Hiking

Hiking is the most common activity in the National Park. The region is a traditional area for hiking and climbing. Therefore, the main part of visitors comes for these activities.

The hiking trail network has a length of 100 km in the National Park (118 km in the planning area, 127.5 km in the Natura 2000 site). It is maintained by the Austrian alpine association (OEAV), which has assured to do this in compliance with the purposes of the National Park visitor management (Partnerschafts-uebereinkommen Nationalpark Gesaeuse, OEAV und Land Steiermark 11th July 2003). Currently, visitors are also allowed to go apart from the hiking trails (cp. Annex: 16.1.9 Law concerning the permission of cross-country walking in mountainous areas *Gesetz, betreffend die Wegefreiheit im Berglande* (1922)).

According to § 9 of the National Park Plan prescription/regulation the National Park Gesaeuse Ltd. is obliged to work out a concept for hiking and climbing trails, ski mountaineering routes by taking into consideration the ecological situation. Within this concept it would be possible to prohibit the entering of ecological sensitive areas for a certain time or all over the year.

The intensity of use of the different trails was estimated by taking into account the number of overnight stays in refuges and the number of records in summit books (K. Scheb, oral information):

Low intensity: < 500 visitors per year

Moderate intensity: 500 – 2000 visitors per year

High intensity: > 2000 visitors per year

In peak periods more than 5,000 visitors per year can be found in the area around the refuge 'Hesshuetten'.

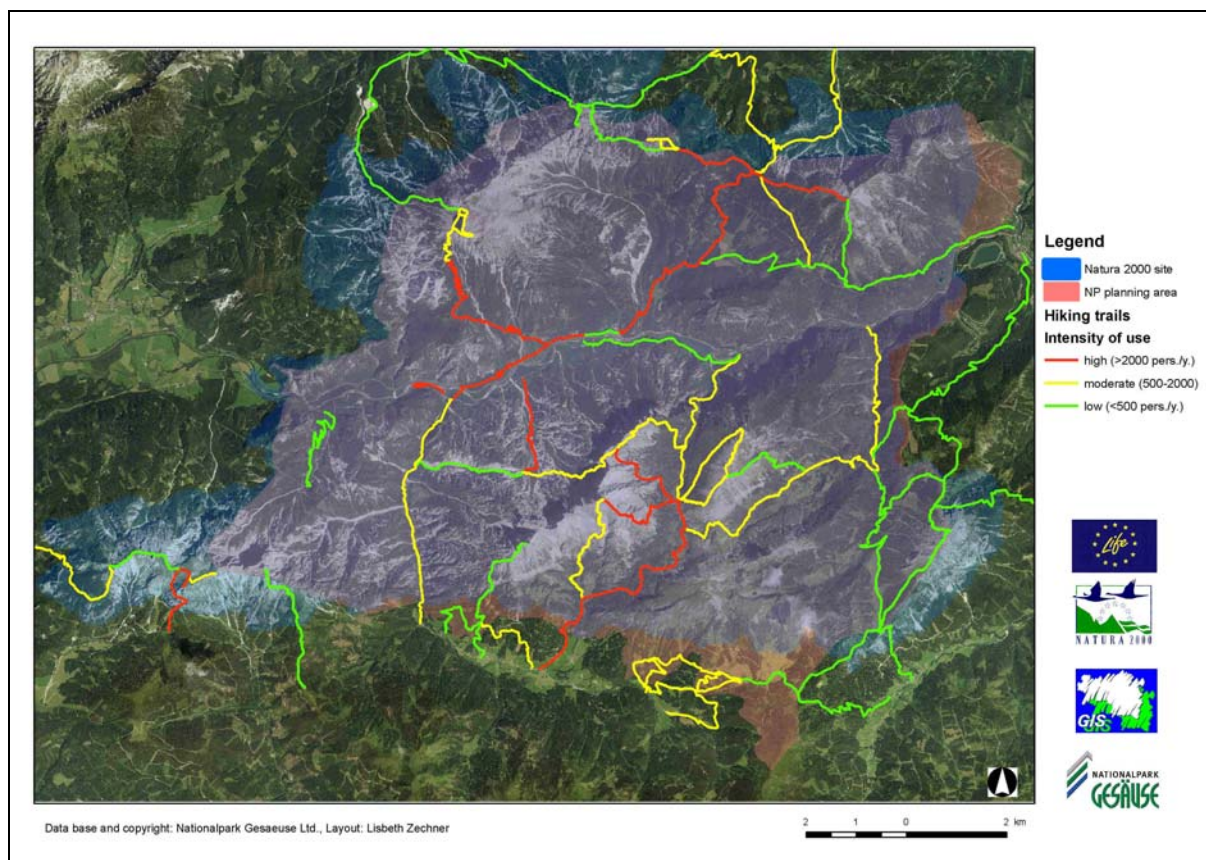


Figure 8. Hiking trails with intensity of use.

The mainly visited peaks in the Gesäuse include the *Tamischbachturm*, the *Hochtor* and the *Große Buchstein* (Table 10).

Peak/trail	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
<i>Gr. Buchstein</i>	1263	830	1924		1925		1983	1599	1289	1538
<i>Gscheideggkogel</i>			1126	1147	1475	1198	1701	1720	1623	1395
<i>Hochtor</i>	1747	1300	1880						1341	
<i>Planspitze</i>	1328	883							1134	
<i>Sulzkarhund</i>							751	698		
<i>Tamischbachturm</i>	1913	1229				1936	3197	2218	2259	2437
<i>Teufelssteig</i>							902	570		
<i>Zinoedl</i>	967	700		1136					1393	1607

Table 10. Number of records in summit books for the mostly visited peaks in the Gesäuse.

In addition to the official trail net, a considerable number of unofficial trails (for hunters) exist, which partly have been marked illegally.

7.2 Climbing

7.2.1 Alpine climbing

The Gesäuse is a traditional climbing region. First climbing activities started more than 200 years ago (REINMUELLER et al. 2002).

Because of the complex situation of climbing routes it is not possible to give an exact overview of the more than 2,000 routes. For detailed information consult END (1988) and REINMUELLER et al. (2002). Climbing routes are found in the Hochtorn group (south: *Kleiner Oedstein, Festkogel Vorbau, Festkogel, Rinnerstein, Schneekarturm*, area of *Hesshuetten*; north (Figure 9): *Großer Oedstein, Haindlkar, Haindlkarturm, Hochtorn, Dachl, Rosskuppe, Peterschartenkopf* and *Planspitze*), the *Buchstein* group (*Großer Buchstein, Kleiner Buchstein* and *Tieflimauer*) and the *Reichenstein* group (*Admonter Kalbling, Sparafeld, Reichenstein*).



Figure 9. Climbing routes in the Hochtorn group (northern side).

For 203 routes the intensity of use was estimated by J. Reinmueller (Figure 10):

Low intensity: <1-5 tours per year

Moderate intensity: 6-10 tours per year

High intensity: >10 tours per year

Also, the intensity of use for the ascent and descent trails was classified by J. Reinmueller:

Low intensity: 1-10 tours per year

Moderate intensity: 1-20 tours per year

High intensity: >20 tours per year

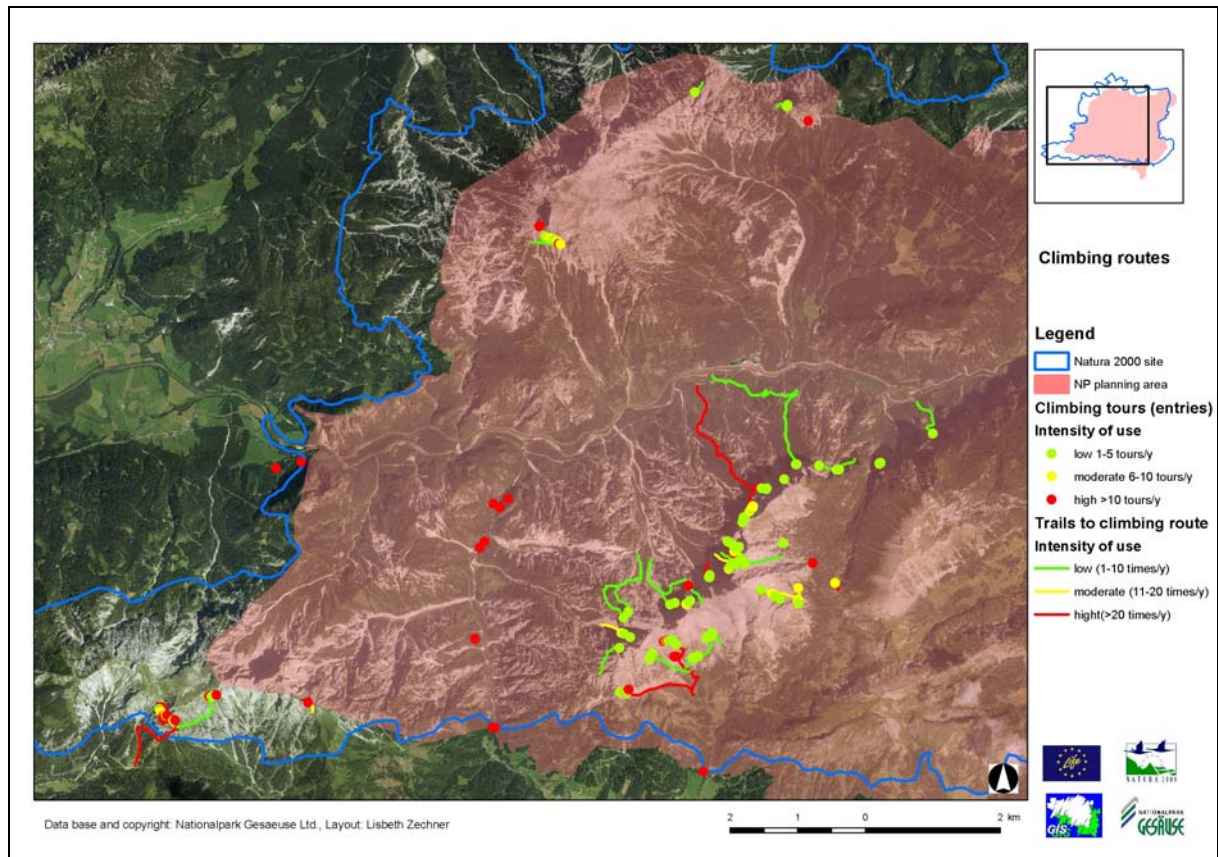


Figure 10. Ascent and descent trails and starting points of climbing routes with intensity of use.

7.2.2 Sportsclimbing

Sportsclimbing takes place in easily accessible rocks with short climbing routes (SCHEB 2002). Most of the sportsclimbing routes in the Gesäuse are found in the conservation zone quite close to roads:

<i>Alter Klettergarten</i>	Conservation zone
<i>Kaderalbl (Gseng)</i>	Conservation zone (used by the NP-programmes)
<i>Johnsbacher Tunnel</i>	both zones/outside of the NP
<i>Gamsstein</i>	Conservation zone
<i>Wolfbauern Wasserfall</i>	Conservation zone
<i>Wandau</i>	outside of NP
<i>Haidlhof</i>	outside of NP

<i>Hellichter Stein</i>	Natural zone
<i>Gsengstein</i>	Conservation zone
<i>Mitterriegelgraben (Torre)</i>	conservation zone
<i>Silberreith (Pfarrmauerngrat)</i>	Conservation zone /outside of NP
<i>Ebnerklamm</i>	Conservation zone

7.2.3 Fixed rope routes

There are two fixed rope routes in the National Park: the *Buchstein-Suedwandsteig* to the *Große Buchstein* and the *Teufelssteig* to the *Tieflimauer*. At the *Teufelsteig* 382 people were recorded in the route book 2006 (15.10.06, R. Thaller, I. Mitterboeck).

7.2.4 Ice climbing

The ice climbing routes are found in JENTZSCH et al. (2005):

- *Bahnarena, Hieflau*: 7 routes (25 m), 10 -15 tours per year
- *Scheibenbauernbruecke, Hieflau*: 9 routes (25 m), 15 – 20 tours per year
- Winter ascent *Wasserfallweg* (510 m), 2 – 4 tours per year
- *Wasserfallweg Arena* (upper part, 80 m), 2 – 4 tours per year

The intensity of use was estimated by J. Reinmueller. The period for ice climbing (1.5 – 3 month per winter) depends on the weather and temperature.

The oldest route is that of the *Wasserfallweg*, which is used since the 1980s. The routes of the *Scheibenbauernbruecke* are used since 2003 (J. Reinmueller, oral information).

7.3 Mountainbiking

In the National Park biking is limited on public roads and on the marked mountainbike routes. Mountainbiking on hiking trails, logging roads or cross-country is prohibited (cp. SCHEB 2002).

Currently one mountainbike tour – the *Hochscheiben* mountainbike tour, which goes 15.7 km from *Gstatterboden* to *Hieflau* (626 m difference in altitude) – is marked and advertised by the National Park Gesaeuse Ltd. A folder and infopoints provide good information for the visitors. Data on the intensity of use of the route are not available yet.

In *Johnsbach*, a mountainbike route to the Koelbl- and Ebneralm was marked by the tourism association.

In addition, the construction of a biking route along the Enns is planned.

7.4 Rafting, kayaking and hydrospeeds

Rafting on the river *Enns* is mainly provided by commercial guides, who need a licence to go with big rafting boats (>3 persons). The licence is awarded by the local government. Illegal rafting in big boats without licence is mainly offered by foreign agencies. Currently 10 local entrepreneurs obtain the licence for rafting from 1.5. - 15.10. every year (9:30 a.m. to 5.30 p.m.). The number of boats on the Enns at the same time is limited with 40. A contract (1.5.2006 – 15.10.2008) between the Styrian Provincial Forestry Commission/National Park and the rafting entrepreneurs regulates the use of entry and exit sites for rafting along the river. Within this contract the rafting companies are obliged to follow the rules for environment-friendly behaviour.

Private people come mainly with small rafting boats or kayaks. Data on the motivation of rafters to come to the Gesaeuse and on the portion of private rafting tours are not available yet. But the number of boats was counted in 2005 (25th May – 16th October). The maximum was 55 boats on weekend days. Zero boats were counted on 30 day (Figure 11).

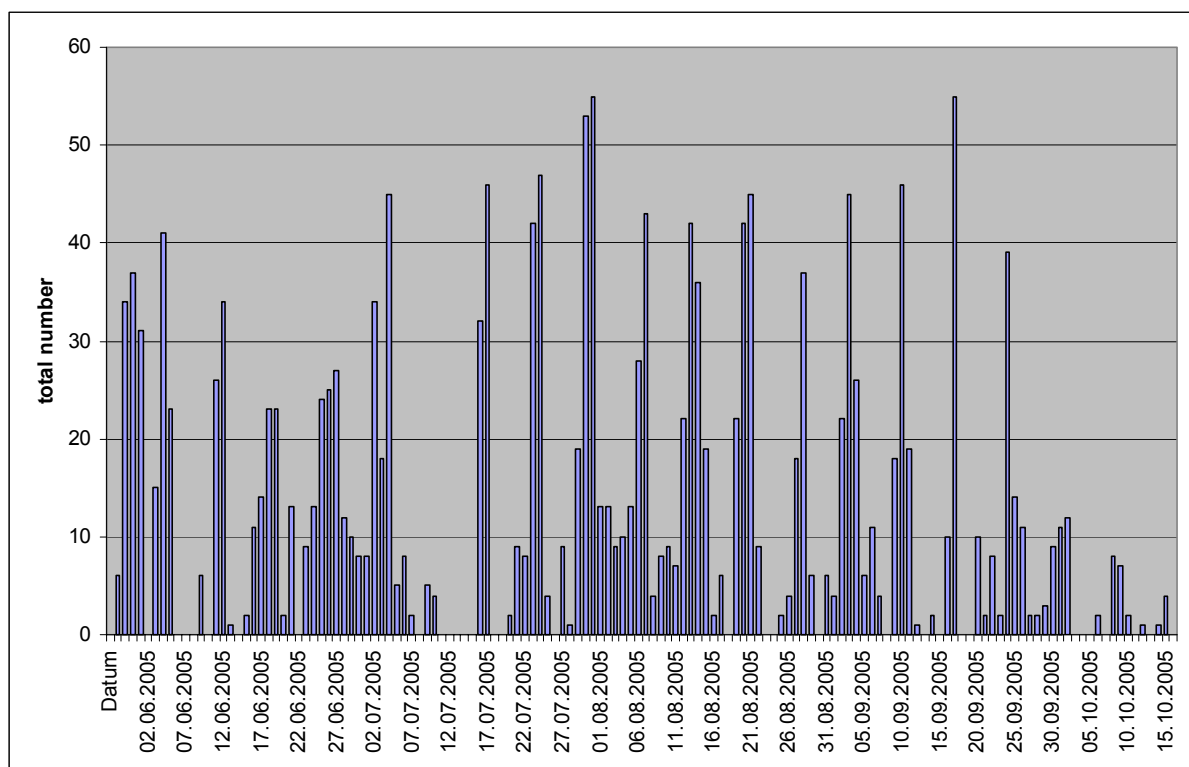


Figure 11. Number of rafting boats, kayaks and hydrospeeds per day (2005).

The previous surveys of boats showed, that big rafting boats dominate. 2006 1404 rafting boats, 257 kayaks, 106 minirafts and 53 hydrospeeds were counted (Figure 12). HAMMER (2006) observed 311 big rafting boats, 26 minirafts, 28 kayaks and 15 hydrospeeds. Both surveys were conducted apart from the main kayak section and the number of kayaks may be too low, therefore.

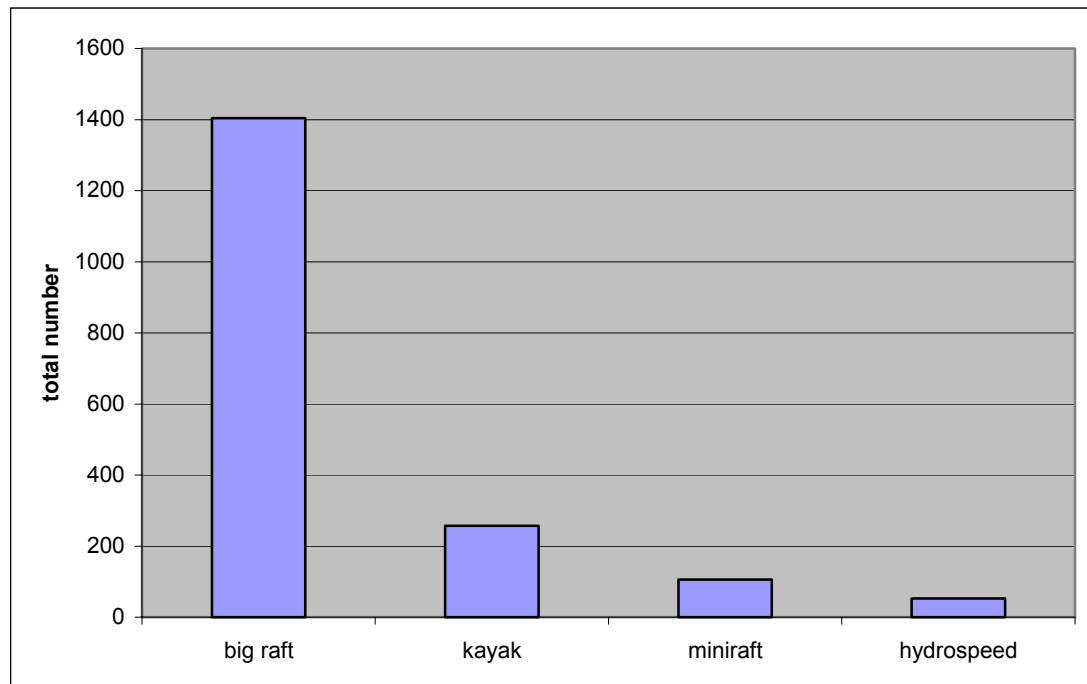


Figure 12. Number of observed boat types in 2005 ($n = 1820$).

Both surveys also showed that the number of boats and persons is higher during weekends than during weekdays (Figure 13). HAMMER (2006) had 4 boats and 26.7 persons on average during weekends ($n = 74$ observation hours) in comparison to 1.6 boats and 11.7 persons during weekdays ($n = 55$ observation hours).

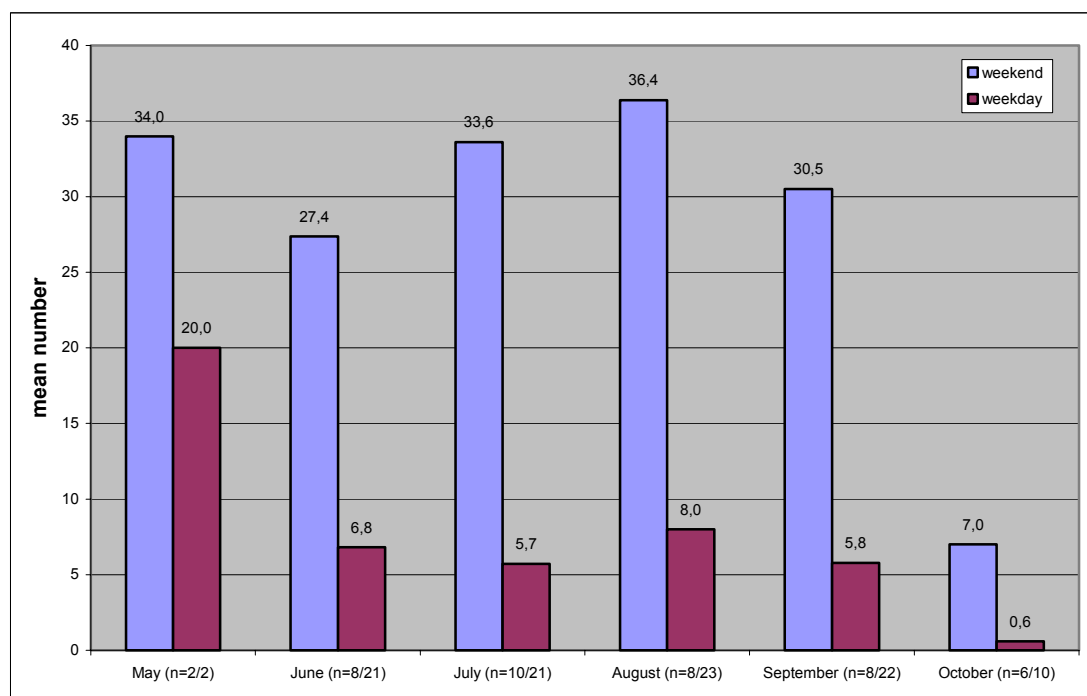


Figure 13. Mean number of boats per month 2005 split in weekends and weekdays (P. Sterl).

7.5 Canyoning

Canyoning activities take place in the *Bruckgraben* depending on weather conditions, from end of May till September. Data on numbers of visitors are not available yet.

According to the IUCN recommendations for the National Park Gesäuse canyoning should be stopped as a fun and action activity. Possibilities for watersports are already given with rafting and kayaking (M. Zupančič-Vicar & H. D. Knapp, in litt.). Studies show that the personal and sportive experience dominates. Nature experience plays an inferior role (FLUKER & TURNER 2000).

7.6 Recreation at the river

Currently, three visitor areas are marked out. Two are along the Enns, at the *Johnsbach* mouth and at the camping ground 'Forstgarten'. One is at the *Johnsbach*, around *Kainzenalblgraben*, which will be replaced by a site further downstream at 'Hellichter Stein' in 2008.

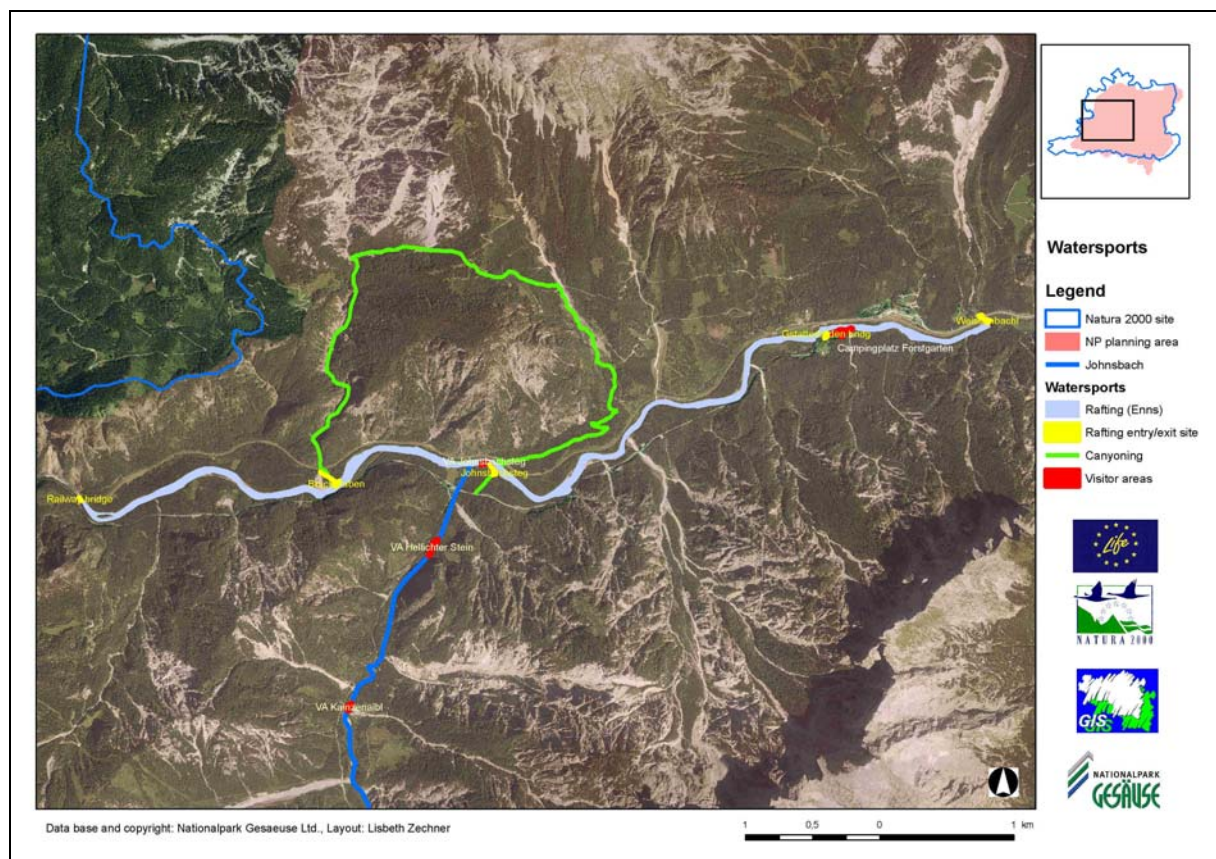


Figure 14. Watersports and recreation at the river.

7.7 Angling

The 'Casting Club' with 22 to 24 members is leaseholder for angling along the *Enns* in the National Park (U. Grollitsch, in litt.). Angling is practised from 16th

March to December. The number of angling days is 60 to 135 per year (Table 11, U. Grollitsch, in litt.).

Year	Angling days along the Enns
2002	61
2003	97
2004	135
2005	125
2006	88

Table 11. Number of angling days of the Castingclub 2002-2006 (U. Grollitsch, in litt.).

7.8 Mushrooming

Currently, the collection of mushrooms doesn't play a major role in the National Park (R. Haslinger, H. Kranzer, oral information). For mushrooming people come mainly to the *Gstatterboden* area in August and September. Data on the number of people who go mushrooming are not available.

7.9 Camping

The official camping ground *Forstgarten* with a capacity of 150 persons is situated in *Gstatterboden*. Campers are also found on parking places. Sporadically illegal camping in the National Park area is observed.

The parking places in the National Park are not opened for camping. For camping on private parking places the agreement of the landowner is necessary whereas public parking places are opened for camping (R. Gollner, in litt.).

7.10 Caves

More than 400 caves are known in the National Park or Natura 2000 area respectively. Two of them, the *Baerenhoehle* and the *Jahrlingmauerhoehle* are protected by the nature conservation law (HERRMANN & STUMMER 2007).

According to § 3 of the National Park Plan regulation the entering of caves in the 'Natural Zone' is only permitted for scientific purpose. However, caves are entered illegally, mainly close to hiking trails and climbing routes (HERRMANN & STUMMER 2007). Numbers of trespassing are not available.

The only show cave in the area is found in *Johnsbach (Odelsteinhoehle)*, outside of the National Park or Natura 2000 site respectively.

7.11 Aviation

Except of emergency landing, starting and landing of sporting planes, helicopters and paragliders is prohibited in the National Park. According to § 13 of the

National Park Plan regulation one is only allowed to overfly its territory in a minimum altitude of 150 metres. Data on the number of overflights are not available, yet they seem to happen quite regularly.

Helicopter flights for first aid or supply of refuges are permitted. Currently, the *Hesshuetten* is supplied by helicopter. These flights occur monthly from May to October. The number of flights depends on the weight of the material. In May about 40 – 50 t of material have to be transported (800 kg/flight). For the monthly supply 5 - 6 flights are necessary each time (R. Reichenfelser, oral information).

In addition, helicopter flights take place for mountain and canyoning rescue exercises. Sightseeing flights by helicopter occur during events. Data on the frequency of these flights are not available.

Some episodes with basejumping are known from the National Park, e. g., at the *Himbeerstein*, but are not considered within this concept because of infrequency.

7.12 Ski mountaineering

The Gesäuse region is a traditional and famous area for ski mountaineering. The number of ski mountaineers has increased for the last 15 years, especially in *Johnsbach*, where negative effects on nature and congestion of traffic can be observed already.

Exact data on the number of ski mountaineers are not available, but during weekends with fair weather about 90 cars (2005) or even 130 cars (2007) were counted in *Johnsbach* (GRUENSCHACHNER-BERGER & PFEIFER 2005, H. Reichenfelser, oral information).

The intensity of use was estimated for the different routes by K. Scheb and is shown in Figure 15:

Low intensity: up to 20 persons per weekend

Moderate intensity: >20 - 200 persons per weekend

High intensity: >200 persons per weekend

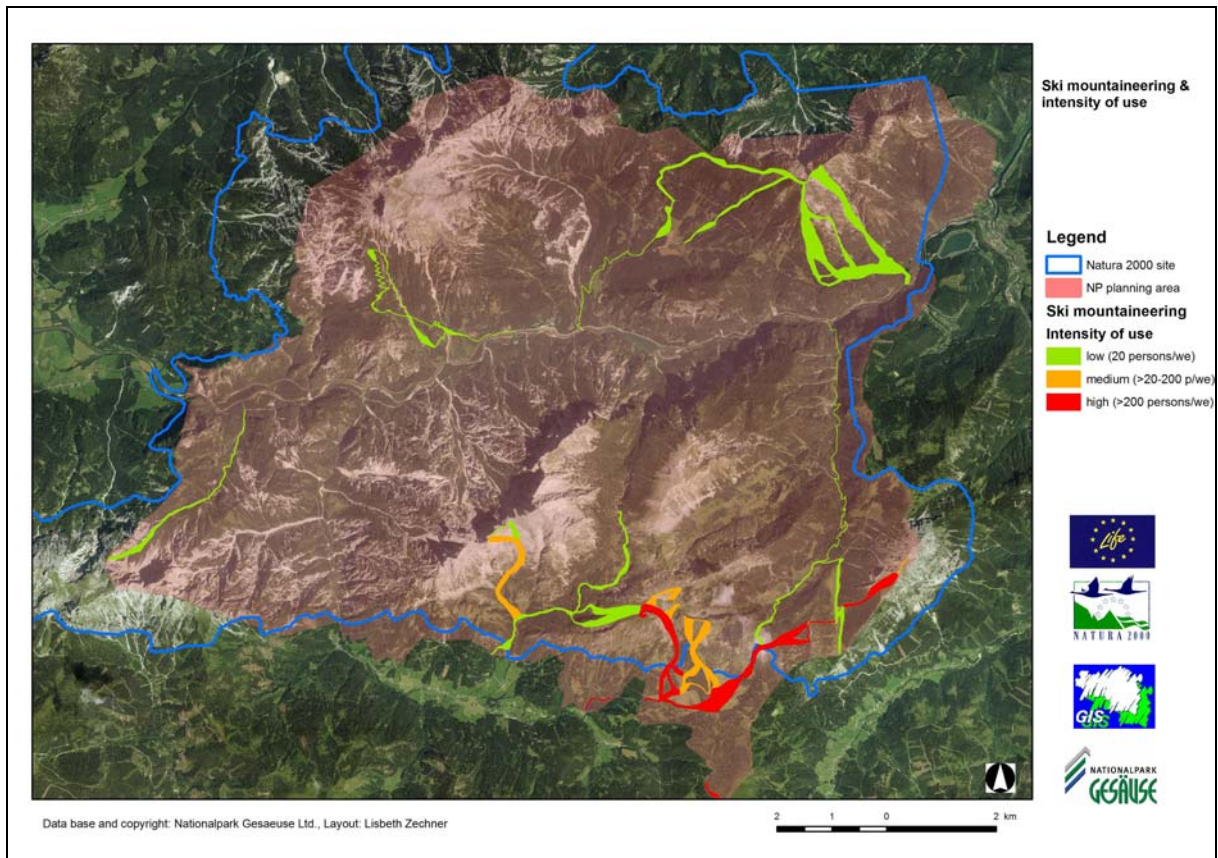


Figure 15. Ski mountaineering routes and estimated intensity of use.

Classical routes go to the *Stadlfeldschneid*, *Glanegg*, *Leobner* or *Gscheideggkogel*. At the *Gscheideggkogel* the number of records in the summit book has doubled since 1986 (Figure 16). In *Johnsbach*, also the starting point for the famous *Lugauer* tour is found. On this tour 34 skiers per 2 hours could be counted at the *Zirbengarten* on their way to the *Lugauer* (2nd April 2005) (GRUENSCHACHNER-BERGER & PFEIFER 2005). The tour to the *Tamischbachturm* on the north side of the river *Enns* is less frequented.

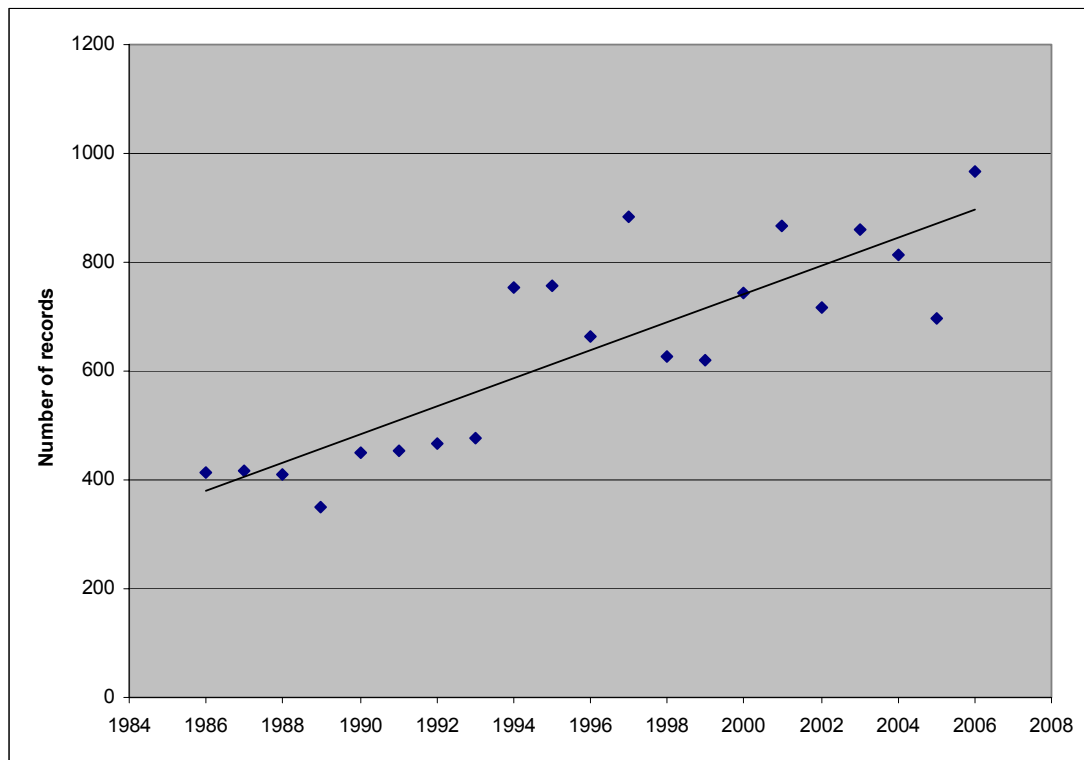


Figure 16. Number of records in the summit book of Gscheideggkogel.

7.13 Snowshoeing

The National Park Gesaeuse Ltd. offers snowshoeing in its winter programme, which occurs in *Johnsbach* around the alpine pastures (*Koelblalm*, *Ebneralm*), mainly on logging roads. In the winter 2006/07 23 persons participated at seven excursions (I. Mitterboeck, in litt.).

Beside these organised trips, snowshoeing becomes quite famous in general. Mainly, the *Gscheideggkogel* is a popular destination for snowshoeing in the National Park (own observation 2007/03/11).

7.14 Tobogganing

Tobogganing is almost only done at the *Ebneralm* in the border area of the National Park during weekends and holidays. On weekdays mainly groups come for sledging. Data on the number of sledgings are not available, but the owner of the alpine pasture rents up to 40 sledges (G. Zeiringer, oral information).

7.15 Cross-country skiing

Cross-country skiing doesn't play a role in the National Park area or Natura 2000 site, respectively. Cross-country ski runs are found in *Johnsbach* and in the surroundings of *Admont*, *Weng* and *Hall*.

7.16 National Park programme

The total number of visitors in the National Park (only programmes, exhibitions, etc.) has increased from 7,887 persons in 2004 to 32,905 persons in 2006. An overview of excursions and participants is given in the annex (16.5 Numbers of participants within the National Park programme).

Most excursions happen along marked hiking trails (cp. annex). For offering special experience some excursions occur apart from these hiking trails, e. g., nighttimes hiking tour camping ground *Forstgarten* - *Mardersteingraben*, excursion *Rauchboden* trail - *Buchsteinhaus*, wildlife observations.

Summer programme

During summer season mainly excursions and events on National Park topics with regional aspects are offered. The programme includes traditional excursions on orchids and mushrooms, wildlife observations as well as landart workshops and camps for children (P. Sterl, in litt.). In 2005 1,274 participants were counted within 98 events.

Winter programme

The winter programme includes presentations on National Park topics and nature experience excursions, e. g., observation of wildlife, snowshoeing, etc. (P. Sterl, in litt.). In 2005 589 people participated within 51 excursions and presentations.

Programme for schools

The programme for schools is a central element of the educational work in the National Park. Programmes are offered for all age groups with age-specific activities. Most school classes come for three to five day programmes. Apart from education, nature experience plays a major role (P. Sterl, in litt.).

The number of participants within the school programme is increasing and reaches more than 7000 participants per year (see annex, 16.6 Numbers of participants within the school programme).

7.17 Visitor facilities and nature trails

Major visitor facilities include the information centre in *Admont*, which is run by the National Park Ltd. and the tourism association. It offers information on hotels, restaurants, programmes and sights. The relief and virtual overflight of the National Park are additional attractions there.

Beside a restaurant, the pavilion in *Gstatterboden* hosts an information centre, a geology exhibition and the virtual overflight. The willow dome offers programmes for schools and visitors on aquatic animals, biodiversity and soil with the possibility of microscoping.

In 2007, a small camp with 3 huts (3 x 4 m, 120 m² including fencing) and a toilet was built at the *Hochscheibe* for school camps (*Waldläufer*-camp).

The *Lettmairau* nature trail was opened in 2006. It offers nature experience orientated stations on alluvial forest, river dynamics and dead wood. Data on visitor numbers are not available. Indirect numbers are available for the 'speaking beech', which was handled 1,441 times in 2006 (24/06-26/10). The interactive fairy-tale was operated 1,812 times during the same period (H. Modre, P. Sterl).

2007 and 2008 the renewal of two old nature trails, *Rauchboden* trail and *Sagenweg*, is planned. First PDA guided tours on geology are planned for these two nature trails and further to the *Hesshuetten*.

The willow dome, pavilion and nature trails should concentrate visitors along the Enns and *Johnsbach*.

2010 to 12 the construction of a treetop nature trail on the topic alpine pastures/forests is planned, whereby the position is not known, yet. An additional nature trail may be built along the old logging road in the *Hartelsgraben*, but concrete planning is missed (M. Hartmann, oral information).

In the National Park area no litter bins are provided, because visitors are asked to take their litter with them. Toilets are found at the willow dome, at the climbing garden *Kainzenalpe (Johnsbach)*, at the visitor area in *Gstatterboden* and in the camp *Hochscheiben*.

7.18 Events

National Park events

Several times per year open air events take place in the National Park, e. g., advent in the willow dome, 'Geo-day of biodiversity', LIFE-events, etc.

Events organised by different operators

Within the National Park only a few events are organised by different operators, e. g. mass at the *Koelblalm*, *Hesshuetten* or *Ennstaler Huetten* (every August). In addition, two jazz concerts are arranged at the *Buchsteinhaus* and *Ennstaler Huetten*.

Former events, like the *Xeiss Rodeo* at the *Gesäuseeingang* or a skiing event at the *Tamischbachturn* are not organised any more.

7.19 Commercial tour operators

The National Park offers good preconditions for sport activities like climbing, canyoning and rafting. These activities are carried out mainly in groups and are often organised by tour operators and/or mountain guides, who know the place.

Commercial tours are only allowed in accordance with the National Park Gesaeuse Ltd. According to the existing agreement, members of the mountain guides' association are allowed to offer climbing and mountain guide activities only.

8 IMPACT ASSESSMENT AND RISK ANALYSIS

This risk analysis was conducted according to PROEBSTL et al. (2007) by consulting different experts. It summarizes information on negative impact from references (e. g. INGOLD 2005, GEORGII & ELMAUER 2002, MARGRAF 2001, etc.) and the estimation of risk according to the matrices (cp. 4.2 Risk analysis for Natura 2000 habitats and species). For each activity and habitat or species, the relevance and intensity of use, as well as the efficiency of management measures were estimated and classified. Because of lacking data, this risk analysis estimates the risk of spoiling, only. According to the precautionary principle the risk was classified rather too high than too low. The results are found in the annex (cp. 16.8 Risk analysis of Natura 2000 habitats and species).

8.1 In general

According to MARGRAF (2001) disturbances of animals can cause three different effects:

1. physiological reactions, i.e. increased frequency of heart or breathing rate
2. behaviour modification
3. ecological reactions: declining of sensitive species.

Reactions on disturbance depend on different factors, e.g. position of the disturbance source, distance to the animals, direction and speed of movement, age and sex of animals, activity of animals, group size, behaviour of the other animals, time of day and year, structures in the habitat, etc. (cp. INGOLD 2005).

Caused by disturbance the habitat quality may deteriorate, or the fitness of individuals may decrease, which causes negative effects on survival and reproduction success. Birds, which have to leave the nest during breeding because of disturbance, may loose fitness or the whole clutch, caused by predators. Altogether, disturbance may cause the decline of species or a change in species composition (INGOLD 2005).

Nowadays, recreation activities are practised anywhere and anytime, all over the year. The comparison between spatial and seasonal arrangement of activities with the distribution of animals shows the following aspects (INGOLD 2005):

- ◆ Overlapping of recreation activities and distribution of animals in different altitudes
- ◆ Concentration of leisure activities during breeding season and winter time
- ◆ Large-area activities during winter (ski mountaineering, snowshoeing)
- ◆ Overlapping of winter sport activities with breeding season

- ◆ Concentration of activities on special habitats during breeding season (climbing – rocks)
- ◆ Concentration of activities at and in water during breeding season.

Negative impacts on plants and habitats may be caused by trampling of vegetation, loss of herbaceous vegetation or seedlings and a change in species composition. Along intensively used hiking trails soil compaction and erosion of organic litter and soil may occur (LIME et al. 2004).

8.2 Hiking

Hikers may influence animals along the hiking trail. The affected area will be comparatively small, if people stay on the marked hiking trail. But hikers may cause more disturbance during the early morning or late evening hours.

The following maximum flight distances of different species are known (cp. INGOLD 2005):

- ◆ Chamois: 200 m
- ◆ Marmot: 50 m
- ◆ Black grouse, ptarmigan: 100 m

The impact of hiking depends on the density and distribution of hiking trails. New hiking trails will cause additional disturbance (INGOLD 2005).

Hiking trails in the National Park are well marked, thus the management expects most of the visitors to stay on these trails. Therefore the efficiency of management measures is classified as moderate.

8.2.1 Alpine rivers and the herbaceous vegetation along their banks (3220)

This habitat type is almost unaffected by hiking except along the *Johnsbach* (moderate intensity of use), because the main number of hiking trails lead away from the riversides. The relevance of use is low, therefore. The risk of spoiling is low.

8.2.2 Lady's slipper *Cypripedium calceolus* (1902)

Because the species is affected by hiking along the *Johnsbach* (moderate intensity of use) as well as photographers and collectors of orchids (Prenner 2005), the relevance of use is moderate. The risk of spoiling is moderate.

8.2.3 'Speikboeden'

The 'Speikboeden' on the Admonter Kaibling and Zinoedl are close to moderate or intensively used hiking trails, respectively and are endangered by trampling. Currently, the risk is estimated as moderate.

8.2.4 Golden eagle *Aquila chrysaetos* (A091)

The golden eagle breeds with 3 pairs in the National Park. It is difficult to estimate negative impacts on this species and its prey because of its big home-range.

In the Gesaeuse most eyries are not accessible by hikers. Disturbance of breeding adults by hikers is low, therefore. Problems may be caused by hiking trails near to eyries (<150 m) or if the nest is visible from the hiking trail (cp. GEORGII & ELMAUER 2002).

The disturbance in the hunting area is more important, which causes different reactions of prey animals, i. e. flight and taking of cover. This may cause that prey is not available anymore (INGOLD 2005). Main disturbance comes from hiking trails and other roads, which overlap with the hunting area (HOELSCHER 2005). Analysis of this disturbance brought that almost half of the potential hunting area is affected by human activities. Mainly in the Hochtorgroup, around the Hesshuetten, hunting area with chamois, marmot and black grouse is dissected by hiking trails (Figure 17). Within this area a change of hunting behaviour may occur (HOELSCHER 2005).

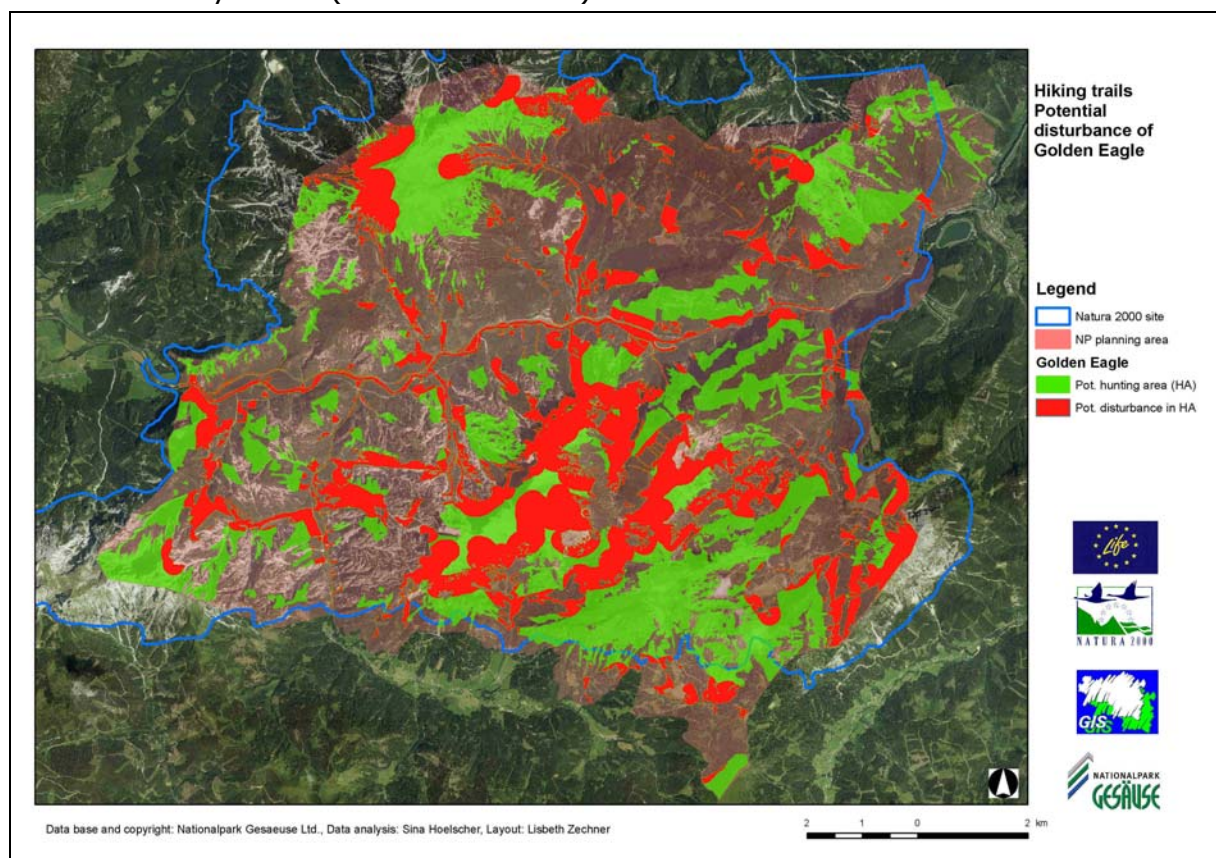


Figure 17. Potential disturbance of hiking trails and logging roads on golden eagle.

The relevance and intensity of use are estimated as moderate, because only parts of the hunting areas are affected. Eagles are supposed to avoid these areas or to change the daytime for hunting activities. Nests are not affected by hiking,

currently. The efficiency of management is moderate (marked hiking trails). The risk of spoiling is moderate.

8.2.5 Grouse species

Along the dense hiking trail network disturbance of ground-breeding bird species may happen, especially because of off-leashed dogs. Hiking activities cause changes in habitat use. Whereas black grouse and ptarmigan have more possibilities to avoid disturbance, habitat of capercaillie is more constrained (GEORGII & ELMAUER 2002, INGOLD 2005).

♦ A104 Hazel grouse *Bonasa bonasia*

The relevance of use is high, taking into consideration off-leashed dogs. Because of the big distribution area it is classified as moderate. The intensity of use is also moderate, because hiking trails are used in low to moderate frequency within the habitat of hazel grouse. The risk of spoiling is moderate.

♦ A108 Capercaillie *Tetrao urogallus*

In *Gstatterboden*, the intensively used hiking trail leads across the courtship display area, the breeding area and the habitat of capercaillie. Also, the hiking trail at the *Goldeck* crosses the habitat of capercaillie. The *Gscheideggkogel* – although there is no marked hiking trail – is visited in summer, too. The relevance of use is high, therefore, especially because of off-leashed dogs. The intensity of use is qualified as moderate. The risk of spoiling is high.

♦ A409 Black grouse *Tetrao tetrix*

Habitats and courtship display grounds are mainly apart from hiking trails. Spatial overlapping exists mainly around refuges, although temporal overlapping of courtship display and hiking activities is low. But the relevance of hiking activities is high during breeding season, especially because of off-leashed dogs. The intensity of use is moderate. Therefore the risk is high.

♦ A408 Ptarmigan *Lagopus mutus*

Spatial overlapping exists mainly at the *Zinoedl* (moderate hiking intensity), the *Buchstein* plateau (moderate hiking intensity), the *Lugauerplan* (low hiking intensity) and along the unmarked hunters' track at the *Stadlfeldschneid*. The relevance of use is high, due to off-leashed dogs. The intensity of use is estimated as moderate, which means a high risk of spoiling.

8.2.6 Grey-headed woodpecker *Picus canus* (A234)

Hiking activities may cause disturbance of grey-headed woodpecker during foraging (low relevance). The major portion of grey-headed woodpecker population is found apart from hiking trails, which means a low risk of spoiling.

8.2.7 Deer species

The degree of disturbance depends on factors like locality, direction and speed of approach. For instance, at the *Augstmatthorn* chamois are less afraid of hikers along the trail than of people who walk across country. Flight distances are higher and movements are longer in the latter case. In addition, groups may disturb more than single persons. According to the BUWAL, 10 % loss of habitat during 10 % of daytime is seen as considerable spoiling (INGOLD 2005).

Because main summer habitats of deer species are partially apart from hiking trails (6.3.4 Additional habitats and species) and hikers concentrate on marked routes, summer habitats are affected only partly (moderate relevance). The use intensity is classified as moderate, which results in a low risk of spoiling.

8.2.8 Marmot *Marmota marmota*

Like deer, marmots react more intensively to persons who go across country. Be it either because they have become used to hikers on highly frequented trails, or because animals close to these trails are less sensitive (INGOLD 2005). Reactions differ along less and highly used trails, e. g., along trails with low frequency reactions are more intensive (NEUHAUS & MAININI 1998).

Numbers on population trends concerning marmots are not available for the National Park. The first survey was executed in 2005 (SCHMOTZER 2007). It showed that the population is in a good condition. Negative impacts of hiking on marmots could not be observed so far, although spoiling may happen in the *Glanegg* in future (H. Kranzer, oral information), where an unmarked hunters' track is used quite often. Yet, marmots should become used to hikers (I. Schmotzer, in litt.).

The relevance of hiking is classified as moderate, because spatial overlapping is given only partly. The intensity of use is high along marked hiking trails in the marmot area, and low along the unmarked trail in the *Glanegg*. Management measures are not given in the *Glanegg*, whereas the efficiency of management actions along marked trails is classified as moderate. Therefore the risk is moderate along the marked trails and low in the *Glanegg*.

8.3 Climbing

Conflicts may occur mainly between climbers and rock-breeding birds. Highly frequented walls with a dense network of routes are not suitable as habitat any more.

Impacts of alpine climbing on birds depend on the density and location of climbing routes. In addition, the access to the climbing starting point may also bring negative impacts during breeding season or in winter (ice climbing). In the National Park the number of climbing tours is very high (approx. 2000 routes). Some problems exist with bad marked tracks to climbing starting points, which

cause many people to go across country. Currently controls or management measures do not exist (low efficiency of management measures).

Negative impacts of sportscimbing in the *Johnsbach* valley on sensitive habitats and species are not known, yet. The sites should be checked for breeding populations of rock martin, for instance. Also, negative impacts of ice climbing are not observed. The number of ice climbing tours is quite low (no to low relevance) and the intensity of use is low.

8.3.1 Golden eagle *Aquila chrysaetos* (A091)

The relevance of climbing is low, because all known eyries are apart from climbing routes (Figure 18). Therefore intensity of use and risk are low.

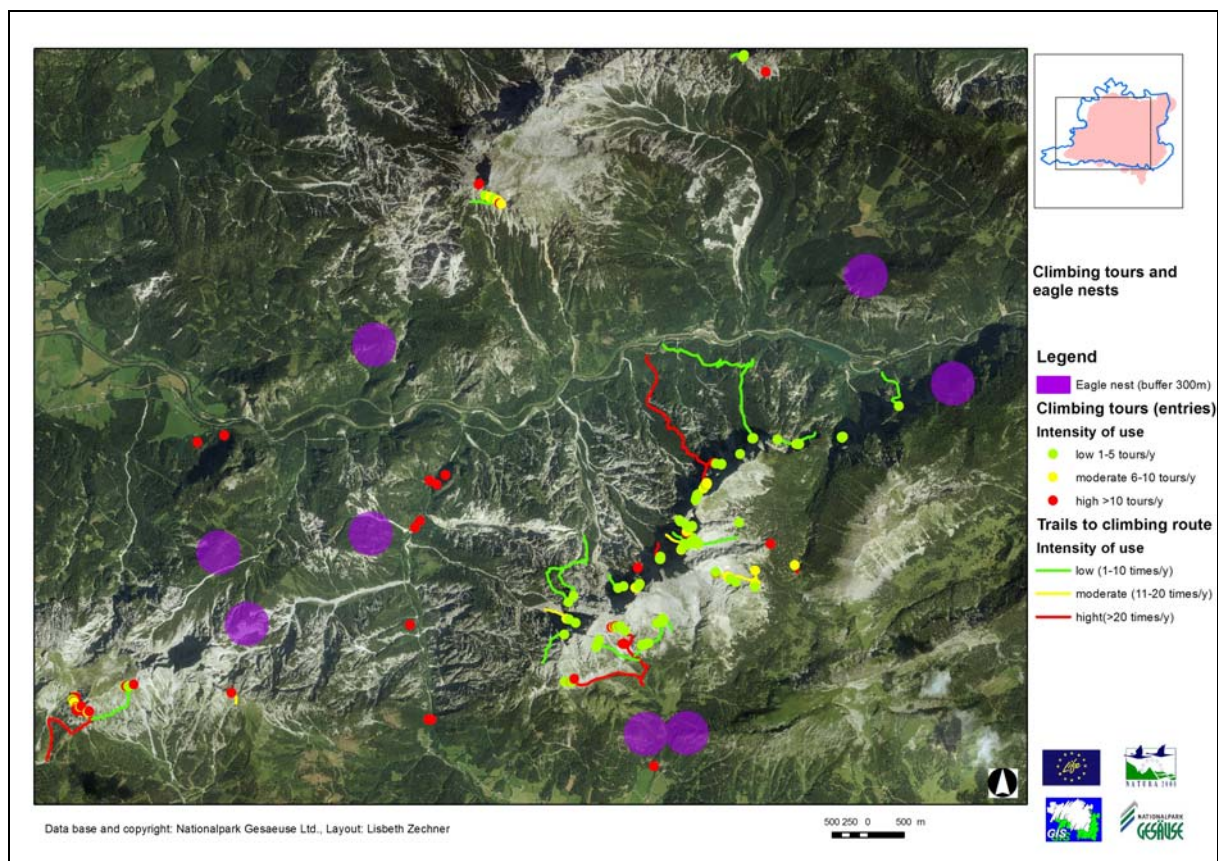


Figure 18. Climbing routes and golden eagle nesting areas.

8.3.2 Peregrine falcon *Falco peregrinus* (A103)

Risk analysis shows that there is not any disturbance because of climbing, currently, because the known breeding site (*Himbeerstein*) is not used for climbing (no relevance).

8.3.3 Eagle owl *Bubo bubo* (A215)

Currently, no spoiling is known, because the breeding rock is not used for climbing (no relevance).

8.4 Mountainbiking

Mountainbiking on trails and roads has similar effects as hiking. Disturbance is given mainly in the late evening, when animals search for food. For instance, deer is affected during browsing on meadows and pastures. Seasonal overlapping is given during breeding season (GEORGII & ELMAUER 2002, INGOLD 2005).

8.4.1 Grouse species

The mountainbike tour '*Hochscheibe*' leads partly through the habitats of hazel grouse and capercaillie (low relevance). The intensity of use is low, currently. The efficiency of management measures is moderate, because people bike also apart from the marked road and enter the centre of capercaillie habitat. There is no risk of spoiling, currently.

8.4.2 Deer species

Negative impacts are given mainly during dusk (moderate relevance). Because of the good conservation status no risk is expected, currently.

8.5 Rafting, kayaking and hydrospeeding

Water sports may have negative impacts on mammals, birds, fish, macroinvertebrates and vegetation (MARGRAF 2001).

The efficiency of management measures is classified as moderate in the National Park, because entry and exit sites are defined and marked. Yet, not all visitors follow these instructions.

8.5.1 Alpine rivers and the herbaceous vegetation along their banks (3220)

Because of landing apart from exit sites, watersports have a high relevance for this habitat type. Also, the intensity of use is high, which means a high risk of spoiling. Spoiling is given mainly at the *Johnsbach* mouth, east of the *Finstergraben* and in the *Schneiderwartgraben* (KAMMERER 2003b).

8.5.2 Otter *Lutra lutra* (1355)

Otters avoid places, where people move in the water for rafting, kayaking, and angling (KRANZ 2007a). For this reason, the relevance of these activities is high. The intensity of use and the risk are high.

8.5.3 Fish species and 1098 Ukrainian brook lamprey *Eudontomyzon mariae*

Disturbance may influence the intake of food, reproduction and growth of fish species. It may also lead to migration. Because of mechanical exposure due to rafting boats in shallow water spawn may be destroyed or spoiled (INGOLD 2005; M. Jungwirth, G. Unfer, oral information).

- ◆ 1098 Ukrainian brook lamprey *Eudontomyzon mariae*

Spawning of lamprey takes place from March to June in shallow, sandy places at the river. The larvae live four to six years in sand and mud along the river banks (HONSIG-ERLENBURG & PETUTSCHNIG 2002, GERSTMEIER & ROMIG 2003).

- ◆ 1131 Varione *Leuciscus souffia*

Varione spawns from March to May in gravelly river banks.

- ◆ 1163 European Bullhead *Cottus gobio*

Spawning of bullhead is known from February to May, in small pits under stones. The species does not migrate, which makes a recolonisation difficult (HONSIG-ERLENBURG & PETUTSCHNIG 2002).

- ◆ Grayling *Thymallus thymallus*

Also, the spawning period of grayling (March – May) overlaps with watersports activities, which start at the beginning of May (MARGRAF 2001, HONSIG-ERLENBURG & PETUTSCHNIG 2002, GERSTMEIER & ROMIG 2003).

For these species a high risk of spoiling is given. The relevance of use was classified as moderate, because overlapping of spawning and watersports activities is given only partly. The intensity of spoiling is high because of a high intensity of use.

8.5.4 Common sandpiper *Actitis hypoleucos*

Regular disturbance may affect breeding success negatively (Ingold 2005). According to REICHHOLF (1998) sensitive bird species are spoiled mainly by high frequencies of boats (one boat every 2 -10 minute).

Observation in the National Park in 2004 showed a significant change of behaviour of common sandpiper due to rafters or other leisure activities at the river (HAMMER 2006). A lot of interferences were observed at the Schneiderwartgraben, where many boats are landing for swimming and camp fires. Disturbance is higher during weekends.

The critical period is given between from the end of April to the beginning of July. The risk of spoiling is high, because the sensitivity of common sandpiper is high (high relevance of use, high intensity of use mainly on weekends).

8.6 Canyoning

Hundreds of visitors in previously unspoilt gorges may evoke negative impacts on plants and animals (INGOLD 2005). According to SCHMAUCH (2001) canyoning affects moss and algae with specialised fauna (beetles, caddies and diptera), macrozoobenthos and fish in the spray water area negatively, whereas in the gorge and in entry/exit areas mainly (gorge)vegetation, water and rock-breeding birds as well as other wildlife is affected.

Negative impacts in the Bruckgraben and entry/exit areas are not evaluated yet. Visitor surveys are still to be executed in order to find out about the number of visitors.

Because there is only a partial spatial overlapping of canyoning activities and habitats, the relevance of canyoning is classified as low for all habitats and species except common sandpiper. The intensity of use is estimated as low, although no data exist (one estimation lays around 100 persons/year, S. Unterberger, oral information). The efficiency of management measures is low, because currently the return transport from the end of the Bruckgraben to the *Johnsbachsteg* is not controlled.

8.6.1 Alpine rivers and the herbaceous vegetation along their banks (3220)

According to Schmauch (2001) canyoning may spoil vegetation (vegetation on rocks, moss, tall forbs, etc.) through trampling in the entry and exit areas. In the National Park the habitat type 'Alpine rivers and the herbaceous vegetation' may be affected by canyoning, but the risk is low.

8.6.2 Otter *Lutra lutra* (1355)

Because of the bad conservation status the risk of spoiling is moderate (cp. Otter *Lutra lutra*, page 59).

8.6.3 Fish species and 1098 Ukrainian brook lamprey *Eudontomyzon mariae*

The Bruckgraben is not important for fish species. For this reason spoiling of fish through canyoning is not expected (M. Jungwirth, oral information).

Troubles may arise in shallow entry and exit areas. In the National Park spoiling may be given by swimming from the Bruckgraben mouth to the *Johnsbachsteg*. Mechanical damage may affect spawn and young individuals of European bullhead and grayling.

The risk of spoiling is estimated as low for lamprey, bullhead and grayling, and as moderate for varione because of its bad conservation status.

8.6.4 Ground beetles

The Bruckgraben does not play an important role for ground beetles because of the high proportion of rock and the permanent, quite heavy flow (Paill 2005).

8.6.5 Common sandpiper *Actitis hypoleucos*

In May and June common sandpiper may be disturbed by canyonists who swim to the *Johnsbachsteg* and pass the breeding place at the *Johnsbach* mouth (moderate relevance). The risk of spoiling is high.

8.6.6 Deer species

The entry area to the Bruckgraben is close to the Pichlmaierschuetz, which is an important habitat for chamois. Disturbance can not be excluded, but a risk of spoiling does not exist, currently.

8.7 Recreation at the river

The gravel banks along the Enns and *Johnsbach* are popular for (sun)bathing, picknicking and camping, mainly on weekends with fair weather from May to September. The intensity of use is classified as moderate due to weather conditions. Although, management measures with three designated visitor areas exist, efficiency of management is moderate, as many visitors do not behave according to the restrictions.

8.7.1 Alpine rivers and the herbaceous vegetation along their banks (3220)

Problems are similar to those of rafting. Recreation at the river may cause trampling of sensitive habitats and vegetation, e. g., tamarisk, small reed. Spoiling is expected at the *Johnsbach* mouth, east of the Finstergraben and at the Schneiderwartgraben (KAMMERER 2003b). The relevance of use and the risk of spoiling are classified as high.

8.7.2 Otter *Lutra lutra* (1355)

Walking along the river bank may cause less disturbance for otters than rafting (KRANZ 2007a). Therefore the relevance is classified as moderate. Nevertheless, because of the bad conservation status the risk of spoiling is high (cp. Otter *Lutra lutra*, page 59).

8.7.3 Fish species and 1098 Ukrainian brook lamprey *Eudontomyzon mariae*

Troubles are again similar to those of rafting: disturbance may cause flight reactions and spoiling of spawning or young fish in shallow water. Disturbance of grayling may be expected in shallow water till August (M. Jungwirth, G. Unfer, oral information). Because these effects are given mainly at visitor areas and

temporal overlapping is only partial, relevance was classified as low. The risk of spoiling is low therefore, except for varione. For the latter the risk is moderate, because of its bad conservation status.

8.7.4 Ground beetles

While impact of rafting and canyoning on ground beetles is low, recreation at the river may cause negative effects in sensitive habitats and evoke the decrease of endangered ground beetle species (PAILL 2005). Negative impact is imminent at the Haselau and *Johnsbach* mouth if numbers of visitors increase, mainly for species in fine sediment (PAILL 2005).

8.7.5 Common sandpiper *Actitis hypoleucos*

Shallow river banks are important feeding grounds for common sandpiper, but are used for recreation, too. Birds may be spoiled in their reproduction (disturbance during breeding, trampling and loss of eggs, etc.), especially along the Enns, where space is limited. People at the river bank evoke warning calls of common sandpiper (HAMMER 2006). Apart from reduction of breeding success, birds may be affected in their fitness for migration.

Areas of conflict exist at the breeding places of common sandpiper, e. g., along the Enns at the *Gesaeuseeingang* (hikers at the *Prokschweg*), at the *Haselau* (illegal entry and exit site for rafters, bathing), at the *Lettmairau/Johnsbach* mouth (visitors of the *Lettmairau* trail, visitor area *Johnsbachsteg*) and at the *Finstergraben* (illegal bathing) as well as along the *Johnsbach* at the *Kainzenalblgraben* (visitor area). The risk of spoiling is high.

8.8 Angling

The temporal overlapping of angling and breeding season may evoke conflicts. Fishermen may disturb birds during breeding or feeding of juveniles (INGOLD 2005). Flight distances of mallard and grey heron depend on regional circumstances, but may exceed 100 m (EICHELMANN 1993).

The dimension of disturbance depends on the intensity of use, seasonal differences, places for angling and behaviour of fishermen (MARGRAF 2001). The use intensity of angling is classified as low (cp. number of days of angling, Table 11). There are no management measures, currently. For this reason, the efficiency of management measures is low.

8.8.1 Alpine rivers and the herbaceous vegetation along their banks (3220)

The risk of spoiling is moderate, because the relevance of angling was estimated as moderate. Anglers are able to enter at all river bank areas.

8.8.2 Otter *Lutra lutra* (1355)

Walking along the river bank may cause less disturbance for otters than rafting (KRANZ 2007a). Therefore the relevance is classified as moderate. Anyhow, because of the bad conservation status the risk of spoiling is high (cp. Otter *Lutra lutra*, page 59).

8.8.3 Fish species and 1098 Ukrainian brook lamprey *Eudontomyzon mariae*

Walking along the river during fly fishing may spoil larvae of fish (INGOLD 2005). Because of the temporal limitation of angling in the section 'Gofer – Lettmairau' (prohibition of angling 16.4. – 15.6.), little impact on spawning of grayling, varione, bullhead and lamprey is expected. Spoiling of other river sections can not be excluded. The relevance of angling is classified as low, which means a low risk of spoiling for fish species (except varione) and lamprey due to angling.

8.8.4 Common sandpiper *Actitis hypoleucos*

Walking along the river may disturb breeding places of birds. Risk for common sandpiper is high, because of moderate relevance and lacking of management actions.

8.8.5 Mushrooming

Effects of people who go for mushrooming across country are much higher than of people who stay on the hiking trail. In addition, big areas are searched for mushrooms (INGOLD 2005). Temporal overlapping with the breeding season of ground breeding birds (grouse) may happen. Because of mushrooming activities in the early morning or late evening animals may be disturbed in foraging (GEORGII & ELMAUER 2002).

Numbers of people who go for mushrooming are not available for the National Park at the moment, but the intensity of use is classified as low. The lack of management measures brings a moderate intensity of spoiling.

8.8.6 Grouse species

♦ A104 Hazel grouse *Bonasa bonasia*

Because the number of people who go for mushrooming is low at the moment in the National Park, the relevance of this activity is classified as low. The risk of spoiling is low, too.

♦ A108 Capercaillie *Tetrao urogallus*

Mainly in Gstatterboden, extensive disturbance may occur due to mushrooming, if number of people increase. Currently, the relevance of mushrooming is estimated as low. The risk of spoiling is low, therefore.

8.8.7 Deer species

Extensive disturbance will occur for red deer in August and September, mainly in Gstatterboden, if the number of people who go mushrooming increase. Currently, no risk is assumed.

8.9 Camping

8.9.1 Alpine rivers and the herbaceous vegetation along their banks (3220)

Currently, no risk for spoiling is given for this habitat type, because illegal camping only singularly occurs.

8.10 Caves

8.10.1 Caves not open to the public (8310)

Sensibility and endangerment of caves was evaluated by HERRMANN & STUMMER (2007), whereby 60 of 232 caves were classified as sensitive. 85 caves are classified as endangered because of one or more reasons. Most of them are endangered because of their near position to climbing and canyoning routes or hiking trails. In addition, direct spoiling and pollution were classified by HERRMANN & STUMMER (2007). The most frequent spoiling is given by waste. According to ELLMAUER (2005c) more than 90 % of the 231 evaluated caves show a good conservation status (A). 18 caves were classified with conservation status B (see Annex, 16.3 Caves in the National Park (Conservation status B)).

Although, sensitivity of caves is high, the relevance and intensity of illegal entering are low. In the Gesaeuse caves are not used as show caves or for sport activities. In addition, most of them are difficult to access. For these reasons, the risk of spoiling is low, currently.

8.11 Aviation

Flying of helicopters, planes or gliders close to the slope or ridge may cause strong reactions of animals due to noise and shock. The intensity of spoiling depends on flight altitude, frequency of flights and cover of vegetation. In open areas chamois react stronger than near to rocks and bushes. Temporal overlapping of aviation with breeding season or wintertime is the main problem (ZEITLER 1995, INGOLD 2005, GEORGII & ELLMAUER 2002).

Investigations in Germany have shown that in Aircraft relevant Bird Areas ABAs, e. g., areas with golden eagle or black grouse, the legal minimum flight altitude of 600 m above bottom protects sensitive bird species and prevents accidents due to birdstrike (www.bfn.de/0323_aba.html).

8.11.1 Golden eagle *Aquila chrysaetos* (A091)

Aviation can cause spoiling of hunting areas and hunting activities of golden eagle and may decrease the availability of prey. Additionally, courtship display may be disturbed or occupied nests may be abandoned, which implies the loss of brood (GEORGII & ELMAUER 2002). Therefore, a minimum distance of 300 m to the nest has to be kept (BRENDDEL et al. 2000).

In the National Park from May to July mainly helicopter flights to the *Hesshuetten* cause disturbance at golden eagle nests (cp. 7.11 Aviation). It was observed that nests were abandoned in this area in 2005 and 2007. Additional spoiling of golden eagle nest is possible in the Enns valley (north side of *Zinoedl, Gstatterstein*). The legal situation with 150 m minimum distance to the bottom is totally insufficient.

The relevance of aviation is high for golden eagle. Intensity of use is classified as moderate (no management measures), which results in a high risk of spoiling.

8.11.2 Peregrine falcon *Falco peregrinus* (A103)

The situation for peregrine falcons' nests is similar. Problems exist mainly in the Enns valley, e. g., *Himbeerstein*. Data on the frequency of flights are not available. The legal situation with 150 m minimum distance to the bottom is totally insufficient.

The relevance of aviation is classified as moderate. Even a low intensity of use would cause a high risk of spoiling.

8.11.3 Grouse species

- ♦ A408 Ptarmigan *Lagopus mutus* and A409 Black grouse *Tetrao tetrix*

Helicopter, planes and gliders may disturb breeding activities of grouses. Within a low intensity of use, a moderate risk of spoiling is given, already.

8.11.4 Marmot *Marmota marmota*

Information on spoiling of marmots due to aviation is not available. Hence, the risk of spoiling was not evaluated.

8.12 Ski mountaineering

Impacts of ascent and downhill skiing are different. The speedier movement top down is unfavourable and needs more space. Therefore disturbance of animals is higher. Skier may evoke flight reactions, which cause higher energy consumption and/or displacement from sources of food. Effects are extremely strong for grouse species, which do not have any fat storage. Hence, risk of mortality is high. Additional negative impacts of ski mountaineering exist because of temporal overlapping with courtship display of grouse species. Another problem

is ascent early in the morning or descent late in the afternoon, which cause disturbance during foraging for deer species (Ingold 2005, www.bfn.de/natursport/test/SportinfoPHP/infosanzeigen.php?sportart=Tourenskilauf&z=Sportart&code=g67&lang=de#auswirkungen). Disturbed deer species may cause damage in the forest.

Due to the "law concerning the permission of cross-country walking in mountainous areas" (*Gesetz betreffend die Wegfreiheit im Bergland*), people are not obliged to follow the recommended routes of the National Park Ltd.

8.12.1 Golden eagle *Aquila chrysaetos* (A091)

During winter (December – April) main disturbance is caused by ski mountaineering. About 2/5 of hunting areas are affected and availability of prey is reduced (Hoelscher 2005). Spatial overlapping of skiing activities and hunting areas are given at the Hochtor, Stadlfeldschneid and Lugauer as well as at the northern part of the Tamischbachturm. Mainly the Stadlfeldschneid is affected quite heavily (Figure 19). Golden eagles will have to change their hunting areas.

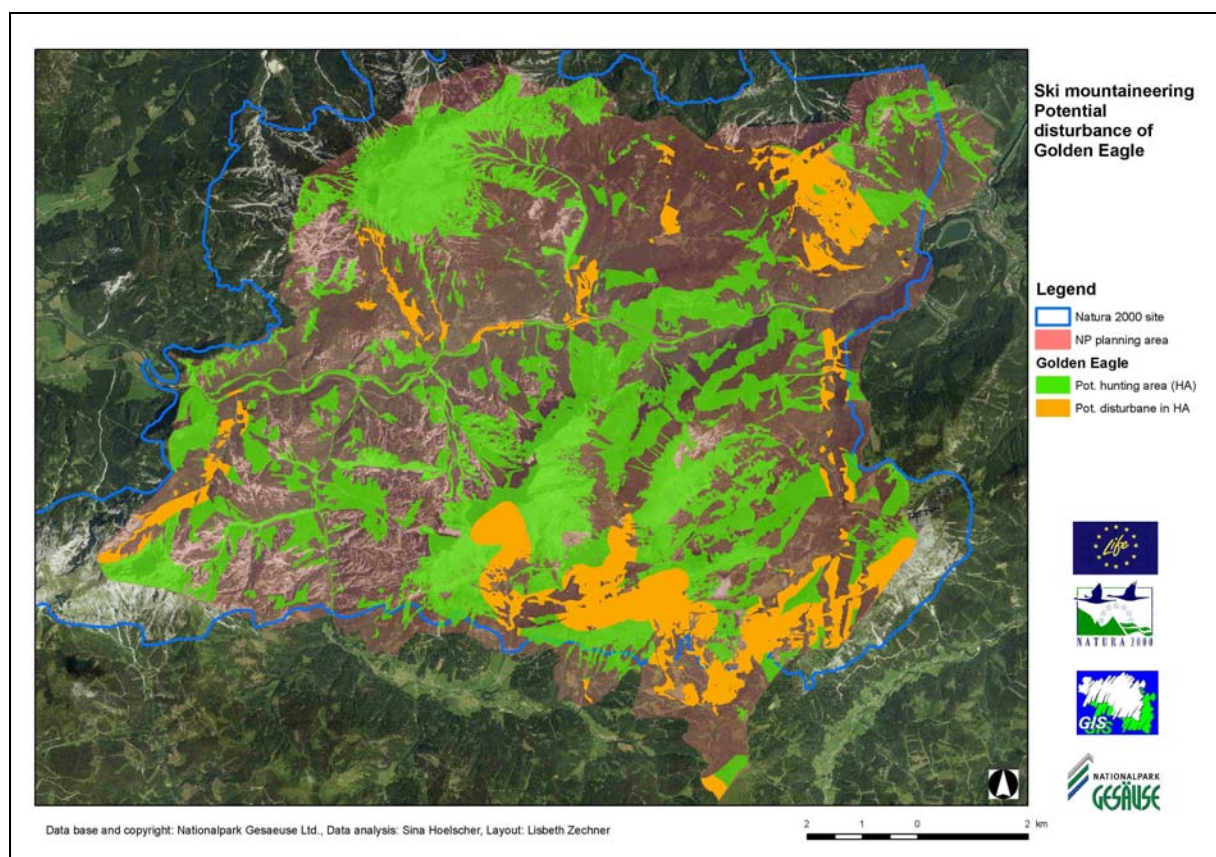


Figure 19. Potential disturbance of golden eagle through ski mountaineering (after HOELSCHER 2005).

According to the analysis risk of spoiling is moderate, if intensity of use is estimated as moderate for the whole National Park.

8.12.2 Grouse species

Disturbance of grouse species caused by ski mountaineering may occur 300 m on both sides of the routes, depending on the relief and structure of the area (ZEITLER 1995, GRUENSCHACHNER-BERGER & PFEIFER 2006)

Black grouse and ptarmigan are mainly found at and above the timberline, whereas capercaillie inhabits the middle and lower parts of slopes, where skier may use logging roads so that problems are less crucial. The use of important habitats may be limited because of skiing activities and animals may be displaced to less favourable habitats. Flight reactions need more energy and the danger caused by raptors is increased. The time for feeding, roosting and courtship display may be reduced because of ski mountaineering (GEORGII & ELMAUER 2002, ZEITLER 2001). Especially in winter, the 'strategy of short distances' is important. This means within an optimal habitat food, cover and protection from weather is found in a small area (< 1 to 100 ha) (GRUENSCHACHNER-BERGER & PFEIFER 2005). If optimal habitat is limited within small areas, human disturbance will be more crucial (ZEITLER 2000). Latest studies show that the output of stress hormone is increased with increased disturbance, which happens already at small numbers of skiers (ARLETTAZ et al. 2007).

Early ascent may cause disturbance of courtship display, which can be enforced through overnight stays in huts (cp. *Landesforste* huts). Frequent disturbance of courtship display causes the splitting of big and stabile courtship display groups into instable, small groups with 2 to 6 cocks (ZEITLER 2001).

The intensity of use was classified as low in *Gstatterboden*, and as high at the *Gscheideggkogel* and *Zirbengarten*. The efficiency of management measures is estimated as moderate, because of the management project, but evaluation of the efficiency is urgent. Therefore, the intensity of spoiling is low in *Gstatterboden* and high at the *Gscheideggkogel* and *Zirbengarten*.

♦ A104 Hazel grouse *Bonasa bonasia*

The relevance of use is classified as moderate for the hazel grouse, because within its habitat ascent routes are found mainly along logging roads. Nevertheless, extensive disturbance can be expected in the habitat, e. g., SE *Tamischbachturn*, at the *Koelblalm* and in *Gstatterboden*. The risk of spoiling is low in *Gstatterboden* and high in the southern part of the area.

♦ A108 Capercaillie *Tetrao urogallus*

Gstatterboden: Skiers cross the capercaillie habitat and the courtship display area when ascending to the *Tamischbachturn* or *Ennstaler Huette*, respectively. Also, top down routes dissect capercaillie habitat (Figure 20). Because of low intensity of use, risk of spoiling is moderate, whereby efficiency of management measures is classified as moderate (need of evaluation!).

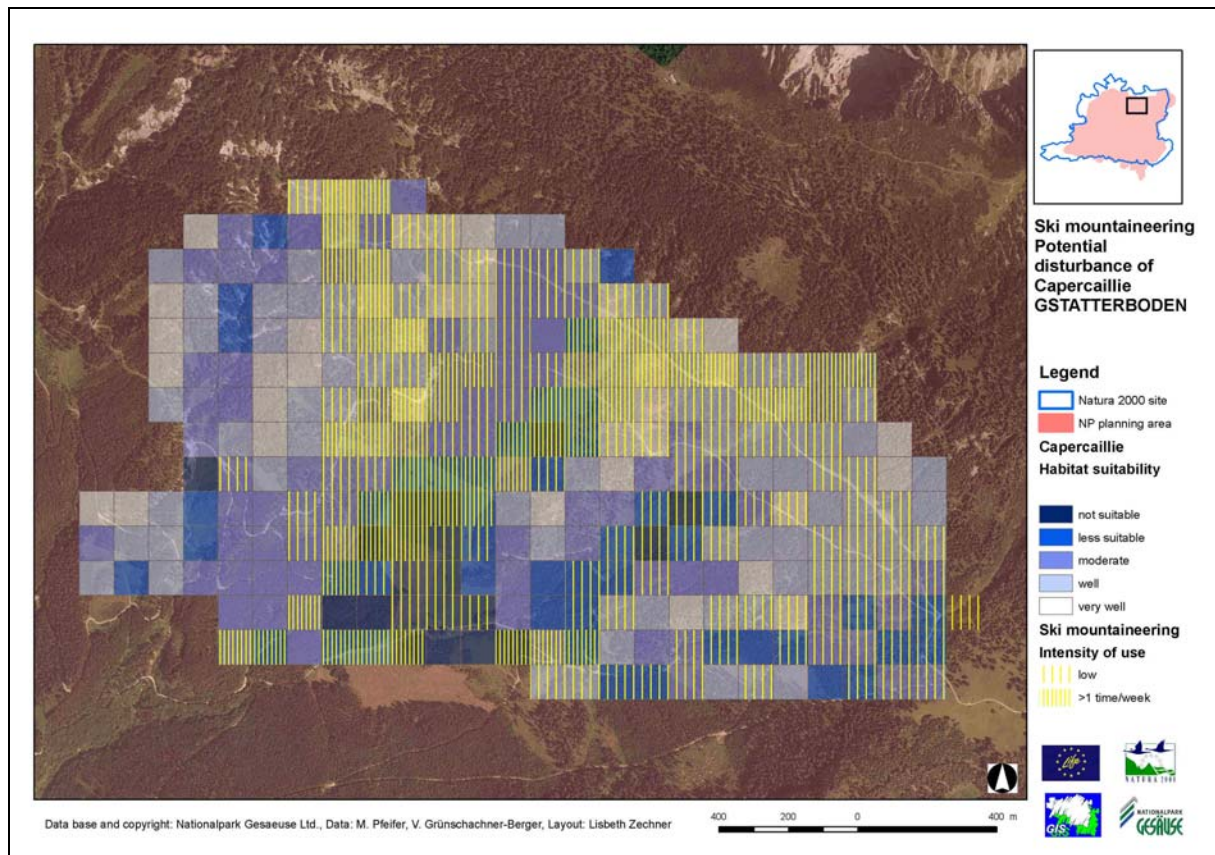


Figure 20. Habitat quality for capercaillie and intensity of ski mountaineering in *Gstatterboden* (after GRUENSCHACHNER-BERGER & PFEIFER 2006).

Gscheideggkogel: According to GRUENSCHACHNER-BERGER & PFEIFER (2005) the high quality habitat at the *Drahbank* and the slope of the *Gscheideggkogel* is very intensively used by skiers (Figure 21). Risk of spoiling is high, because intensity of use is high.

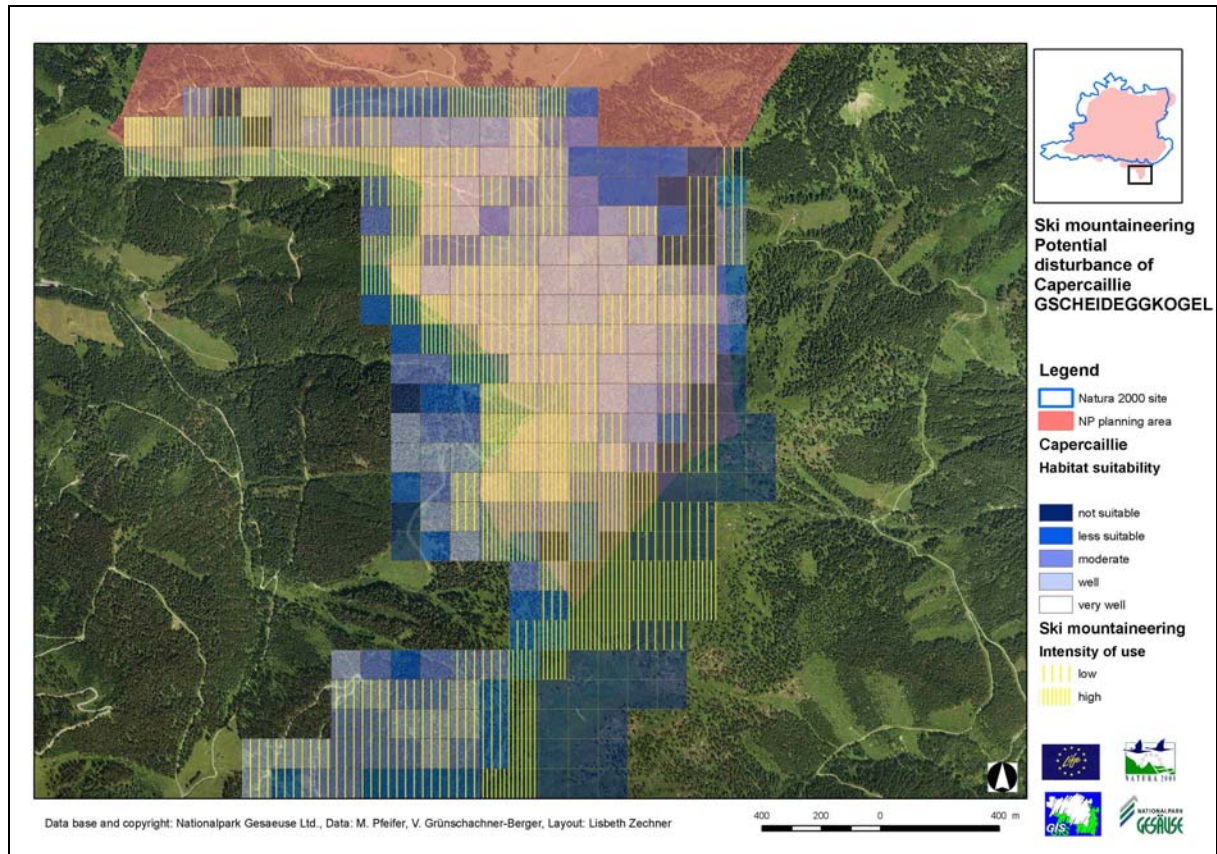


Figure 21. Habitat quality for capercaillie and intensity of ski mountaineering at the *Gscheideggkogel* (after GRUENSCHACHNER-BERGER & PFEIFER 2005).

♦ A409 Black grouse *Tetrao tetrix*

For black grouse the risk of spoiling is high at the *Gscheideggkogel* and *Zirbengarten*.

Gscheideggkogel: The high quality habitat at the top of the *Gscheideggkogel* is used very intensively by ski mountaineering. Apart from the ascent from *Johnsbach*, people ascend from the *Radmer* valley and go also along the ridge from the *Neuburgmoor* or the *Leobner Toerl*. Disturbance is much heavier when people move above the animals (cp. ZEITLER 1995, 2000). Negative impact is expected all over the winter season and it is intensified in times with much snow (Figure 22).

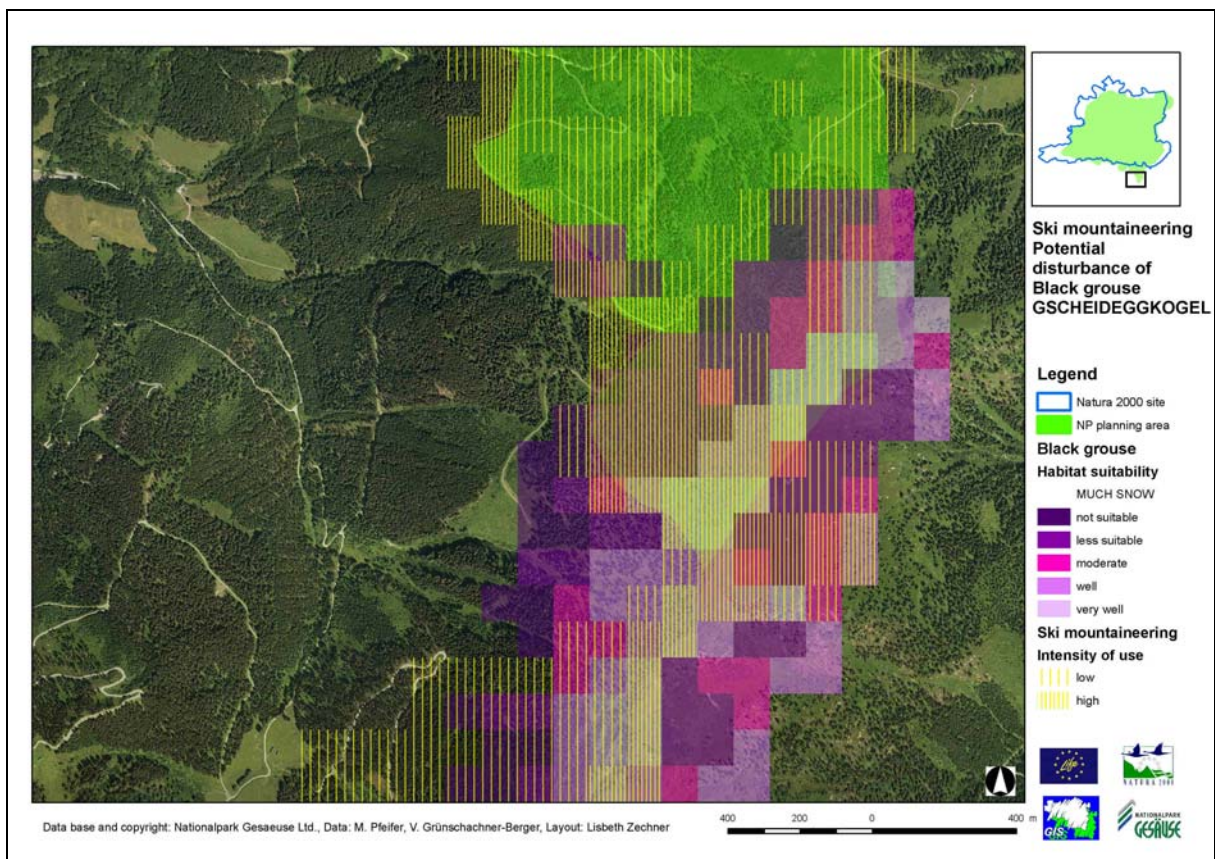


Figure 22. Habitat quality for black grouse (much snow) and intensity of ski mountaineering at the *Gscheideggkogel* (after GRUENSCHACHNER-BERGER & PFEIFER 2005).

Zirbengarten - Huepflingerhals: The *Zirbengarten* has an excellent habitat quality for black grouse because of its vegetation, structure, size (100 ha) and wideness (800 m). It is the biggest and main winter habitat for black grouse in the National Park. Deterioration of habitat quality is high, because the ski mountaineering route divides the habitat in two small fragments (Figure 23). In addition, courtship display is disturbed at the *Huepflingerhals*. The number of courtship playing cocks decreased continuously during the last 25 years. Main reasons for this may be the increase of ski mountaineering (GRUENSCHACHNER-BERGER & PFEIFER 2005, R. Unterberger, oral information).

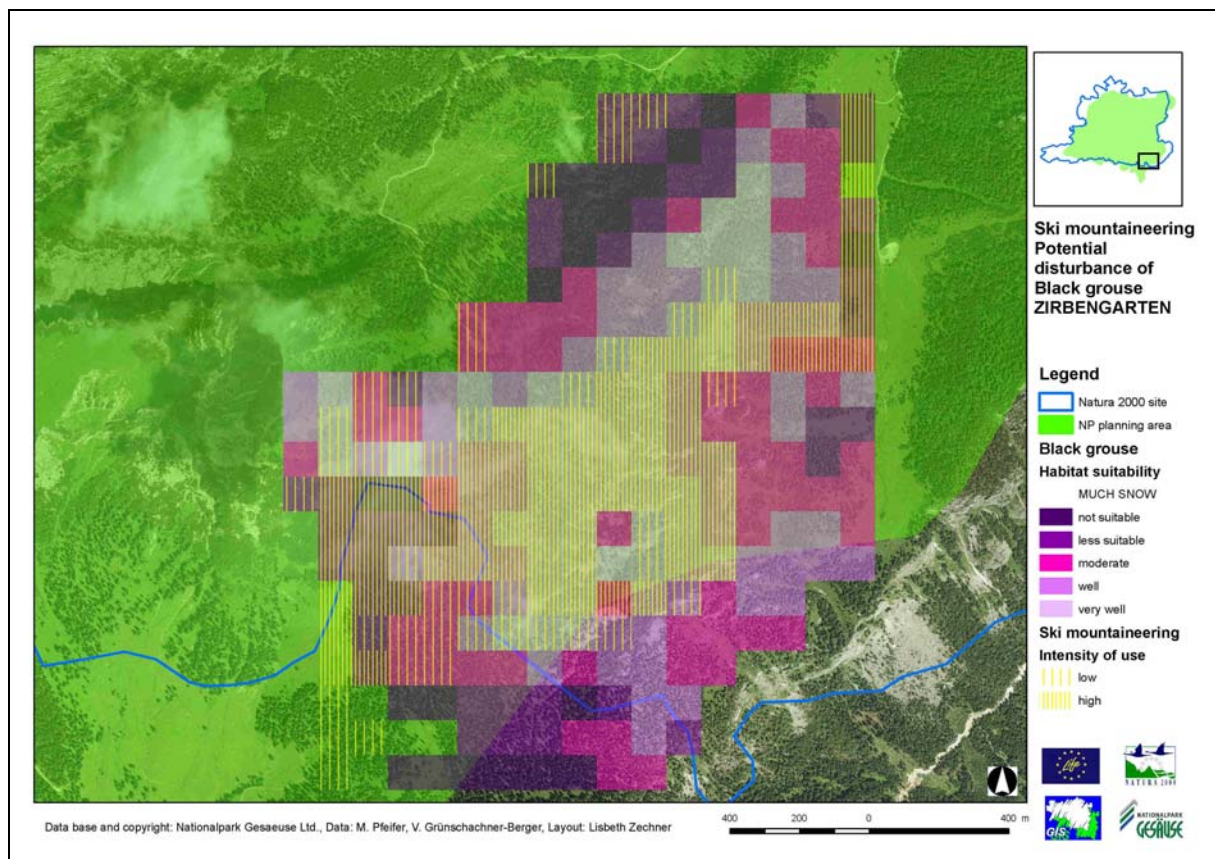


Figure 23. Habitat quality for black grouse and intensity of ski mountaineering at the *Zirbengarten* (after GRUENSCHACHNER-BERGER & PFEIFER 2005).

♦ A408 Ptarmigan *Lagopus mutus*

Also for ptarmigan high risk of spoiling is expected to be high at the Stadlfeldschneid, because of high intensity of use.

8.12.3 Deer species

Disturbance may cause flight reactions. Relevance of ski mountaineering is classified as low, because red deer is in the overwintering enclosure, and chamois are mainly found in areas with little snow, on sunny slopes, which are

not usable for skiing. Therefore it is assumed that no sensitivity and risk is given, currently.

8.13 Snowshoeing

Negative impact of snowshoeing on wildlife is similar to that of ski mountaineering, but partly different areas are used for this activity. Apart from logging roads and hiking trails, people go across country, which may cause heavy disturbance in habitats of grouse species. Additional problems may derive from moonlight walks. In spring, overlapping with courtship displaying of grouse species is given.

The increase of snowshoeing causes increased disturbance. In the National Park, snowshoeing is observed in *Gstatterboden* and mainly in *Johnsbach* at the *Koelbl-* and *Ebneralm*, but also to the *Gscheideggkogel*.

8.13.1 Grouse species

The relevance of snowshoeing is low for hazel grouse and black grouse, because only small parts of the habitat are used for snowshoeing, but moderate for capercaillie (*Gscheideggkogel*). The intensity of use is moderate in the lower parts of the Nationalpark, i. e. habitat of hazel grouse and capercaillie (*Gscheideggkogel*, *Koelblalm*) and low in higher parts, i. e. habitat of black grouse (*Gscheideggkogel*). Management actions are not taken yet.

♦ A104 Hazel grouse *Bonasa bonasia*

The risk of spoiling is moderate, because intensity of spoiling is high.

♦ A108 Capercaillie *Tetrao urogallus*

For the capercaillie, the risk of spoiling is high at the *Gscheideggkogel*, because people go across country and intensity of spoiling is high.

♦ A409 Black grouse *Tetrao tetrix*

The risk of spoiling is low, although disturbance occurs at the ridge of the *Gscheideggkogel*, but intensity of use is classified as low.

8.14 Tobogganing

8.14.1 Grouse species

No risk of spoiling is given for grouse species, because sledging is reduced to one route *Ebneralm* – *Ebnerklamm*. The relevance for hazel grouse is low, because only a part of its habitat is affected. Even if intensity of use is estimated as moderate, management efficiency is high, because of sledging along the logging road. Intensity of spoiling is low, therefore.

8.15 Dogs

Visitors with dogs attend different activities all over the year and may cause additional impacts. Negative impacts are considerable. The flight distance of wildlife, e. g., chamois, marmot, is much higher on hikers with dogs than on cross-country hikers. A high proportion of dogs is off-leashed. These off-leashed dogs may chase wild animals and hurt or kill individuals (INGOLD 2005, PERRIN et al. 2006). In addition, feces of dogs may function as a barrier for wildlife. Infected dogs may communicate neosporosa (www.lgl.bayern.de/veterinaer/hundeparasit_neospora_caninum.htm).

8.16 Landesforste-huts

Leasing of Landesforste-huts for single weekends may cause additional negative impacts and disturbance, mainly in winter at the *Gscheideggkogel* and Zirbengarten. Already leaseholders of huts stay overnight in the area and may start their activities earlier in the morning. Furthermore, they may use unmarked routes to the *Gscheideggkogel*. Transport of luggage by skidoo can cause additional disturbance.

8.17 Alp huts

Much traffic is observed to the *Koelbl-* and *Ebneralm*, which contradicts the aims to reduce traffic in the National Park.

9 MANAGEMENT ZONES

Depending on the activities and management requirements seven management zones were roughly designated.

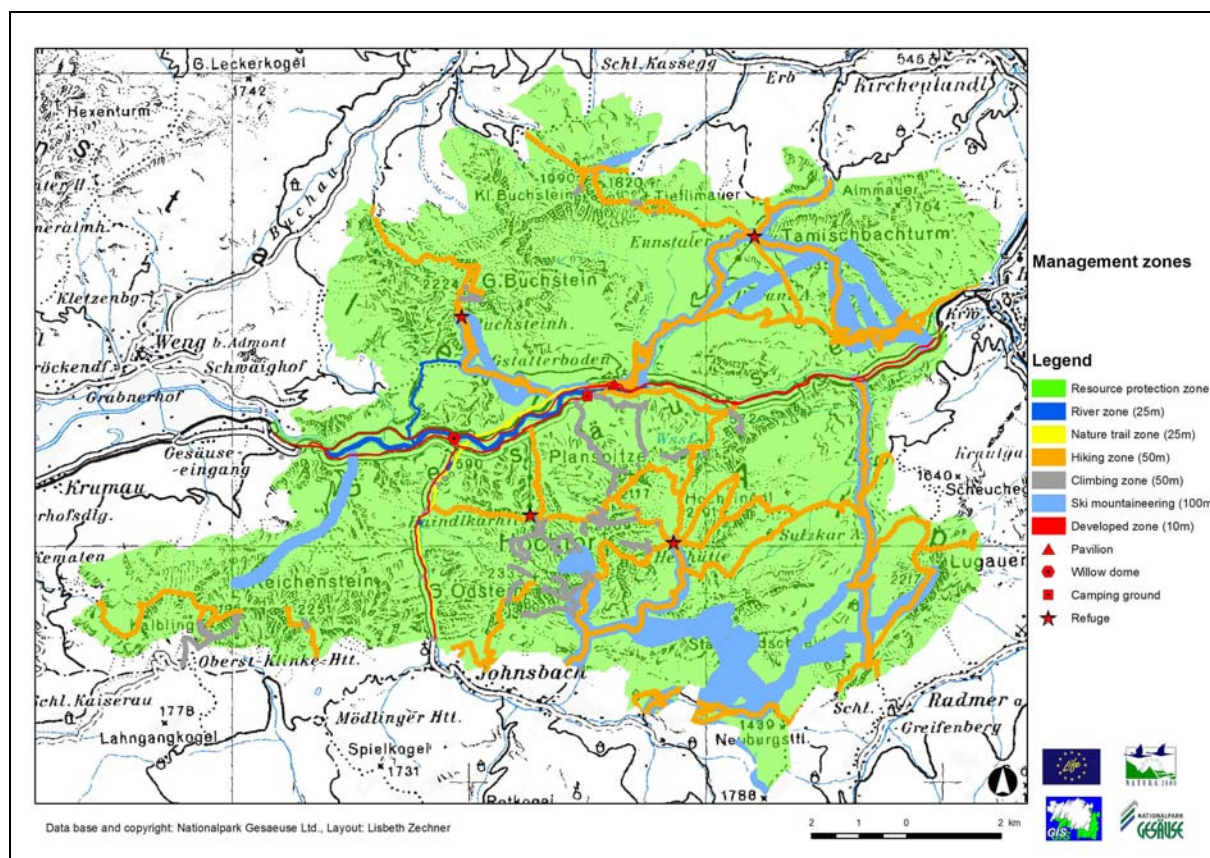


Figure 24. Management zones.

The size of all management zones is shown in Table 12. The resource protection zone overlaps with the natural zone of the National park for 79.5 km² (83.5 %).

Management zone	area [km ²]	%
Resource protection zone	125.3	81.3
Developed zone	0.8	0.5
Nature trail zone	0.4	0.3
River zone	0.8	0.5
Hiking zone	12.1	7.9
Climbing zone	2.3	1.5
Ski mountaineering zone (without overlapping)	12.4	8.1
Ski mountaineering zone total	17.0	11.1
Overlapping		

Management zone	area [km ²]	%
Hiking zone	4.4	2.9
Climbing zone	0.1	0.1
Nature trail zone	0.0	0.0
River zone	0.0	0.0
TOTAL	154.1	100.0

Table 12. Size and percentage of area of all management zones. The ski mountaineering zone overlaps with different zones of summer activity-zones.

9.1 River zone

9.1.1 Area

This zone is comprised of the three visitor areas at the Enns (*Johnsbachsteg*, camping ground *Forstgarten*) and *Johnsbach* (*Kainzenalblgraben*, 2008 *Hellichter Stein*), the rafting route with entry and exit site as well as the canyoning route at the *Bruckgraben*.

9.1.2 Natural resources - sensitive habitats and species

The zone is predominately natural, but with much considerable evidence of the sights and sounds of people.

Common sandpiper, dipper and grey wagtail are characteristic bird species along the river. FFH-habitats include Alpine rivers and the herbaceous vegetation along their banks (code 3220), Alpine rivers and their ligneous vegetation with *Salix elaeagnos* (code 3240) and Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (code 91E0) with species like Tamarisk (*Myricaria germanica*) and the small reed species *Calamagrostis pseudophragmites*.

9.1.3 Accessibility and potential activities

Potential activities in this zone include recreation at the river (bathing, barbecuing etc.), rafting, canyoning and angling. The visitor areas and starting points for rafting and canyoning are easily and quickly accessible, partly by public transport.

Visitors do not need to physically exert themselves, use outdoor skills, or make a large time commitment to use these visitor areas. For rafting or canyoning a longer time commitment and a higher level of physical exertion as well as outdoor skills are required. Rafting and canyoning is done mainly with professional guides.

9.1.4 Challenge and adventure of experience

The environment offers a moderate to high degree of challenge and adventure with the experience of wild water. The probability of encountering other visitors is high.

9.1.5 Intensity of use

Data on visitor numbers are not available yet. In 2005 a boat survey was conducted. Numbers of visitors seems to be mainly high during weekends with fair weather from May to September.

9.1.6 Infrastructure and management

A few support facilities, such as information panels and signs, are present. A high level of management is provided for resource protection (e.g., information panels and signs, information hut, placing stones along trail edges and restricting off-trail use, ranger controls of visitor areas and rafting exit/entry sites). Some resource modifications are evident, but they harmonize with the natural environment.

9.1.7 Development and future conditions

Main purpose for the zone is to improve the visitor management effectiveness and to keep the numbers of visitors low (maximum: present level). It is necessary to maintain the current conservation status of the FFH-habitat types and sensitive species, i. e. otter or common sandpiper. Tolerance for resource degradation is very low (no additional visitor areas). Additional visitor facilities are not planned.

9.2 Nature trail zone

9.2.1 Area

The nature trail zone is comprised of high use nature trail corridors (25 m on both sides) which show main attractions of the National Park: Lettmairau, Sagenweg and Rauchboden trail.

9.2.2 Natural resources - sensitive habitats and species

The areas in this zone are predominately natural, but with much considerable evidence of the sights and sounds of people.

FFH-habitats of this zone include alpine rivers and the herbaceous vegetation along their banks (code 3220), alpine rivers and their ligneous vegetation with *Salix elaeagnos* (code 3240) and alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (code 91E0). In addition, the annex II-species lady's slipper *Cypripedium calceolus* (code 1902) has to be mentioned for this zone, especially in the Johnsbach valley.

9.2.3 Accessibility and potential activities

To use this area, visitors must make a short time commitment and physically exert themselves to some degree. There are limited opportunities for challenge and adventure, and the need for outdoor skills is relatively unimportant. Some trails are accessible to visitors with disabilities.

9.2.4 Challenge and adventure of experience

Visitors can see, touch, smell, and hear park resources as they walk along a well-defined trail, but they will not feel like they are far from their cars or conveniences. This valley bottom experience offers the opportunity for environmental education. Opportunities to experience challenge and adventure are limited. The probability of encountering visitors is very high. Many people may be present.

9.2.5 Intensity of use

Numbers on visitors are only indirectly available, e. g., along the *Lettmairau* nature trail the number of people who operated the 'speaking beech' is known for 2006 (7.17 Visitor facilities and nature trails).

9.2.6 Infrastructure and management

Parts with hardened trails, boardwalks, timber bridges, benches, panels and small interpretive structures are the only facilities present.

The trails are intensively managed in this zone to ensure resource protection and public safety.

9.2.7 Development and future conditions

Main purposes for the zone are to focus the visitors in this zone and to assure the satisfaction of the quality of visitors' experience. Number of visitors should increase within the following years. Resources can be modified for essential visitor and park operation needs (e. g., modernisation of nature trails), but they are changed in a way that harmonizes with the natural environment. Except for these essential changes, tolerance for resource degradation is low here. Maintenance of the conservation status for Lady's slipper is the main nature conservation purpose.

9.3 Hiking zone

9.3.1 Area

The hiking zone is applied to trail corridors (50 m on both sides) and areas of a somewhat more primitive nature than those in the nature trail zone. It includes all hiking trails, fixed rope routes and the mountainbike tour *Hochscheiben*. The zone is a fairly narrow corridor.

9.3.2 Natural resources - sensitive habitats and species

FFH-habitats of this zone include alpine and boreal heaths (code 4060), alpine and subalpine calcareous grasslands (code 6170), species-rich *Nardus* grasslands, on silicious substrates in mountain areas (code 6230), hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (code

6430), mountain hay meadows (code 6520), alkaline fens (code 7230), calcareous and calcshist screes of the montane to alpine levels (code 8120) and calcareous rocky slopes with chasmophytic vegetation (code 8210).

Annex I bird species comprise golden eagle *Aquila chrysaetos* (A091), hazel grouse *Bonasa bonasia* (A104), capercaillie *Tetrao urogallus* (A108), ptarmigan *Lagopus mutus* (A408), Black grouse *Tetrao tetrix* (A409), grey-headed woodpecker *Picus canus* (A234), black woodpecker *Dryocopus martius* (A236), white-backed woodpecker *Dendrocopos leucotos* (A239) and three-toed woodpecker *Picoides tridactylus* (A241).

9.3.3 Accessibility and potential activities

Starting points of hiking trails are mainly accessible by public transports. Visitors must commit a block of time, have the right equipment, some outdoor skills (depending on severity visitors have to be sure-footed and free from giddiness), and expend some physical exertion to use the area.

9.3.4 Challenge and adventure of experience

The hiker zone provides a sense of being immersed in a natural landscape and feels somewhat distant from most comforts and conveniences. Opportunities exist to experience challenge and adventure. The probability of encountering other visitors is moderate to high (although there are opportunities for almost solitary experiences).

9.3.5 Intensity of use

The number of visitors on several trails was estimated (cp. 7.1 Hiking). In addition, indirect data exist for peaks (number of records in summit books). Accurate data on visitor numbers are not available, yet.

9.3.6 Infrastructure and management

Marked hiking trails, fixed rope trails and logging routes as well as signs are the only infrastructure within the zone. A high level of management is provided for resource protection and safety purposes in the hiker zone. Some resource modifications are evident, but they harmonize with the natural environment.

9.3.7 Development and future conditions

Nature conservation goals pursue the maintenance of sensitive habitats and species as well as the reduction of erosion and trampling beside of hiking routes. This should include an improvement of the management effectiveness (people should stay on the marked routes and should not use unmarked tracks). Marking of additional and new routes is not planned. The Park Service's tolerance for resource degradation is low here.

9.4 Climbing zone

9.4.1 Area

The climbing zone is comprised of all climbing routes and trails (50 m on both sides) to the starting points for climbing (if they are not hiking trails). Furthermore, the sportsclimbing areas in the Johnsbach valley are also included.

9.4.2 Natural resources - sensitive habitats and species

FFH-habitats of this zone include alpine and boreal heaths (code 4060), alpine and subalpine calcareous grasslands (code 6170), calcareous and calcshist scree of the montane to alpine levels (code 8120) and calcareous rocky slopes with chasmophytic vegetation (code 8210).

In addition, Annex I bird species comprise golden eagle *Aquila chrysaetos* (A091), peregrine falcon *Falco peregrinus* (A103) and eagle owl *Bubo bubo* (A215) have to be taken into consideration.

9.4.3 Accessibility and potential activities

The sportsclimbing routes are easily accessible, near to the road. Whereas, the use of the alpine climbing tours requires a relatively long time commitment, a (very) high level of physical exertion and the application of outdoor skills, depending on the degree of difficulty.

9.4.4 Challenge and adventure of experience

The climbing zone provides a sense of being immersed in a natural landscape but feels further away from comforts and conveniences than the nature trail and hiker zones. The environment offers a moderate to high degree of challenge and adventure. Opportunities for independence, closeness to nature and tranquillity are moderate to high. The probability of encountering other visitors is low to high, depending on the route.

9.4.5 Intensity of use

The intensity of use is different for the routes (cp. 7.2.1 Alpine climbing). Some sportsclimbing routes are used intensively (also within the National Park school programme).

9.4.6 Infrastructure and management

Facilities in this zone comprise a few cairned routes and primitive trails as well as bolts and pitons in some routes. The different climbs are described in the technical literature. A high level of management is provided for safety purposes in this zone. Some resource modifications are evident, but they harmonize with the natural environment.

9.4.7 Development and future conditions

Conservation goals comprise the maintenance of populations of rock-breeding birds and the reduction of disturbance of these species.

Ascents to climbing starting points and descents have to be controlled and marked to prevent additional disturbance.

9.5 Ski mountaineering zone

9.5.1 Area

This zone includes the corridors (100 m on both sides) of all ski mountaineering routes of the folder 'Winter off-piste Skiing' and other, not advertised routes.

9.5.2 Natural resources - sensitive habitats and species

In this zone annex I bird species comprise golden eagle *Aquila chrysaetos* (A091), hazel grouse *Bonasa bonasia* (A104), capercaillie *Tetrao urogallus* (A108), ptarmigan *Lagopus mutus* (A408) and black grouse *Tetrao tetrix* (A409).

9.5.3 Accessibility and potential activities

The starting points for tours are easily accessible by car or public transports. The use of this area requires a relatively long time commitment and a moderate to high level of physical exertion. The application of outdoor skills and right equipment are necessary.

9.5.4 Challenge and adventure of experience

The environment offers a moderate to high degree of challenge and adventure. Opportunities for independence, closeness to nature and tranquillity are moderate to high. The probability of encountering other visitors is moderate to high.

9.5.5 Intensity of use

The intensity of use depends on snow and weather conditions. It was estimated for the different routes (cp. 7.12 Ski mountaineering).

9.5.6 Infrastructure and management

The routes are signposted and partly marked. A high level of management is provided for resource protection in this zone (e.g., signposting and marking of routes, cutting of the corridors, tracing in new snow, ranger controls, etc.).

9.5.7 Development and future conditions

Main purpose for the zone is to improve the visitor management effectiveness and to keep the numbers of visitors low (present level). It is necessary to maintain or ameliorate the current conservation status of the sensitive grouse species. Tolerance for resource degradation is very low (no additional routes). If it is necessary the access to important habitats has to be prohibited temporary or all year round (§ 9 National Park plan regulation).

9.6 Resource protection zone

9.6.1 Area

The resource protection zone includes areas where no or a very low use is desirable to protect pristine resource areas, and the areas of the park that are difficult to access. Because of the legal situation, it is permitted to enter this area. This zone matches with the natural zone to a great extent (83.5 % of natural zone).

9.6.2 Natural resources - sensitive habitats and species

Sensitive habitats and species include all FFH-habitats and species of the area (cp. Table 7, Table 8 and Table 9).

9.6.3 Accessibility and potential activities

The use of this zone requires in most parts a relatively high degree of physical exertion and a long time commitment. The application of outdoor skills is necessary.

9.6.4 Challenge and adventure of experience

Visitors in this zone experience an untouched, primeval environment, which is after finalisation of the forest management activities devoid of people's works. But trails and logging roads for hunting and forest management are evident, currently. The environment offers a moderate to high degree of challenge and adventure. Opportunities for independence, closeness to nature and tranquility are high. There is a very low probability of encountering others. Similarly, the evidence of other visitor impacts is minimal.

9.6.5 Intensity of use

No data are available on the intensity of use in this zone.

9.6.6 Infrastructure and management

Management for infrastructure and resource protection is very limited. The area is managed in such a way that onsite controls and restrictions are minimized and those that are present are subtle.

9.6.7 Development and future conditions

Main purpose is the maintenance or amelioration of the current conservation status of sensitive habitats and species. The tolerance for resource modifications and resource degradation is very low here. The intensity of use of unmarked trails has to stay low. Logging roads have to be restored. If it is necessary, the access to important habitats has to be prohibited temporary or all year round. The number of visitors should stay as low as possible.

9.7 Developed zone

9.7.1 Area

This zone includes areas with major visitor and administrative facilities, e. g., the roads and parking places, the railway, the park visitor centres (pavilion, willow dome), the campground, and picnic areas.

In addition, the four refuges and the Landesforste-huts are included, although they are situated high up in the mountains.

9.7.2 Accessibility and potential activities

The facilities are convenient and easily accessible, except refuges and huts. There is little need for visitors to physically exert themselves, apply outdoor skills, or make a long time commitment to visit the area. Most facilities in the lower parts are accessible to visitors with disabilities.

9.7.3 Challenge and adventure of experience

Although buildings, structures, and the signs of people are pre-dominant, there are natural elements present. Opportunities for adventure are relatively unimportant. Many of these places offer opportunities for environmental education and social experiences. The probability of encountering other visitors is very high.

9.7.4 Intensity of use

Numbers of visitors are available for the willow dome and geology exhibition in the pavilion (cp. annex, 16.5 Numbers of participants within the National Park programme).

9.7.5 Infrastructure and management

Visitor facilities are intensively managed in this zone in order to guarantee visitor's satisfaction and safety purposes mainly.

9.7.6 Development and future conditions

Resources are modified for visitor and park operational needs. The tolerance for resource degradation is relatively high here. Main purposes are the extension of offers, the increase of visitor numbers and the satisfaction of visitors.

10 AREAS OF CONFLICT

10.1 River zone

The most sensitive areas are found within this zone along the *Enns*, e. g., the *Gesaeuseeingang*, the *Haselau*, the *Bruckgraben* mouth, the *Johnsbach* mouth, the *Finstergraben*, the *Haindlkargraben* and the *Schneiderwartgraben*. In addition, along the *Johnsbach* the section between *Langgries* and *Kainzenalblgraben* is valuable.

According to the ranger protocols, infringements of the National Park's directives are mainly observed at the *Johnsbach* mouth, between the *Finster-* and *Haindlkargraben* as well as at the *Schneiderwartgraben*, where one can find sandy river banks. In 2006, 25 breaches were noticed (illegal landing, bathing, camp fires and camping).

10.2 Nature trail zone

Areas of conflict are mainly found along the *Johnsbach*, between *Kainzenalbl-* und *Langgriesgraben*, because the nature trail *Sagenweg* goes along the river bank, which affects common sandpiper, but also lady's slipper. Along the *Lettmairau* nature trail white-backed woodpecker and dipper may be affected, because they breed in direct proximity to the trail.

According to the ranger protocols, in 2006 several infringements of the National Park's directives by campers and collectors of lady's slipper were observed.

10.3 Hiking zone

Areas of conflict may arise at the *Speikboeden*, close to the hiking trails towards the *Zinoedl* and *Admonter Kalbling*. Problems concerning erosion are observed at the *Rotofen*, the *Gseng*, the *Tamischbachturm*, the *Zinoedl* and to some extent on the way to the *Hesshuetten* coming from *Johnsbach* (D. Kreiner, in litt.).

Conflicts exist also in *Gstatterboden*, along the hiking trail to the *Ennstaler Huetten*, which leads through the habitat and courtship display area of capercaillie. At the *Großer Buchstein*, *Zinoedl* and *Lugauer* conflicts with ptarmigan may occur.

Concerning golden eagle, spoiling is given mainly at the hunting areas around the *Hesshuetten* (HOELSCHER 2005).

According to the rangers' protocols, breaches were observed mainly by bikers, e. g., about 10 times along the *Rauchboden* trail and a few times on the way to the *Buchsteinhaus*, in the *Hartelsgraben* and to the *Pfarralm*.

10.4 Climbing zone

Areas of conflict in connection with climbing activities may occur near to nests of golden eagles, peregrine falcons and eagle owls, but are not known so far.

10.5 Ski mountaineering zone

Relevant conflicts exist in *Gstatterboden* (capercaillie), at the *Gscheideggkogel* (capercaillie, black grouse) and at the *Huepflingerhals/Zirbengarten* (black grouse). Additional conflicts may occur with ptarmigan at the *Stadelfeldschneid*.

10.6 Resource protection zone

In this zone areas of conflict are found at some caves, which are close to hiking trails or climbing routes, e. g., *Baerenhoehle* and *Wildschuetzenhoehle*. In addition, there are conflicts due to illegal marking and the use of hunting tracks (*Hinterwinkel*, *Glanegg*, *Gamsstein*, *Handhabenriedlsteig*).

Additional areas of conflict are given around the ski mountaineering routes (perimeter of 100 – 300 m).

11 MANAGEMENT ACTIONS

According to the precautionary principle management actions can be taken already, once any sign of negative impact on species or habitats is given. Taking into consideration the already existing knowledge, perhaps supplemented by specific targeted surveys, negative impact on species can be evaluated. This can be done by analysing the spatial or temporal overlapping of leisure activities with the habitats of certain species (INGOLD 2005). Thus, scientifically correct confirmation is not necessary, because studies are mostly expensive and time-consuming. Nevertheless, monitoring of tourism and resource indicator is necessary to evaluate management activities.

Because of current experience and knowledge gaps about the impact of different activities, flexible adaption of management actions on new knowledge is necessary. Furthermore, additional visitor experience measures will be developed taking into account the results of the planned visitor monitoring.

Management actions are important there, where deterioration is observed or where the conditions are not acceptable. The measures should improve the situation in the areas of conflict.

Management actions were separated into existing (✓) and planned (→) actions. Table 13 shows the period of implementation of each planned action and the responsible department of the NP Gesaeuse Ltd. for implementation. Most management measures have to be implemented within a short period.

11.1 River zone

11.1.1 Rafting

- ✓ Marked entry and exit site; signposting of sensitive areas
- ✓ Quadrilingual infopoints at the entry site *Eisenbahnbruecke*, at the *Johnsbachsteg* (entry/exit site) and at the *Weißenbachl* (exit site)
- ✓ Quadrilingual folder 'On the water in the National Park Gesaeuse'
- ✓ Information hut at the *Johnsbachsteg*, occupied by rangers during weekends
- ✓ Intensified ranger controls and information of visitors given by rangers
- ✓ Annual training of rafting guides
- ✓ 12 rules for ecologically sound behaviour (see annex)

The existing legal situation disables from controlling and limiting the number of small rafting boats and hydrospeeds (cp. 7.4 Rafting, kayaking and hydrospeeds).

- On the part of the National Park Ltd. the amendment of the Navigation Regulation or the National Park law with a seasonal and daytime limitation as well as a limitation of the number of rafting boots, hydrospeeds and kayaks (e. g., by means of day tickets) is proposed
- Check of all homepages on rafting and kayaking information, for instance www.kajak.at, www.paddeln.at, and update according to the visitor management of the National Park.

11.1.2 Canyoning

- Canyoning tours are allowed only within commercial all-inclusive-packages (ecologically sound behaviour according to GEORGII & ELMAUER (2002) or Ingold (2005) as well as the return transport from the *Bruckgraben* to *Johnsbachsteg* by boat must be guaranteed)
- A limited number of day tickets
- Seasonal limitation of canyoning (only from July to October)
- Canyoning rescue exercises: limitation of the number of exercises, seasonal restrictions (only in August), optimised reduction of helicopter flights within the exercise
- Check of all homepages on canyoning information, and update according to the visitor management of the National Park

In case knowledge on negative impact of canyoning on plants and animals changes, management measures may have to change as well.

11.1.3 Recreation at the river

- ✓ Visitor area *Johnsbachsteg (Enns)*: only the lower part of the gravel bank is designated as visitor area (cp. PAILL 2005)
- ✓ Visitor area camping ground *Forstgarten, Gstatterboden (Enns)*
- ✓ Visitor area *Kainzenalblgraben*, and since 2008 *Hellichter Stein (Johnsbach)*
- ✓ Intensified ranger controls and oral information of visitors by rangers in areas of conflict (LIECHTI et al. 2006, STEINER & PLATTNER 2006).

- Optimised sign-posting and demarcation of visitor areas and sensitive areas (e. g., visitor area *Johnsbachsteg*)
- Closing of illicit parking places and footpaths (*Haselau, Finstergraben, Haindlkargraben, Schneiderwartgraben, Kainzenalbl*)

11.1.4 Angling

- ✓ Seasonal and spatial limitation of angling (cp. 8.8 Angling).

- Information by letter to members of the Casting Club on ecologically sound behaviour, e. g., respect the breeding areas of common sandpiper, etc. (cp. GEORGII & ELMAUER 2002, INGOLD 2005)
- From 2009 on the National Park Ltd. will do fishing management as well. In this regard a limnological concept will be developed.

11.1.5 Actions for sensitive habitats and species

Actions for sensitive habitats and species have to taken into consideration within the amendment of the Navigation Regulation (see above).

◆ 1355 Otter *Lutra lutra*

KRANZ (2007a) recommends a restriction of time and area for rafting to improve the suitable habitat for otters during their active time.

- 1st July – 30th November: prohibition of rafting and kayaking one hour before sunset until one hour after sunrise. 1st December – 30th June: prohibition also during late morning hours.

◆ Common sandpiper *Actitis hypoleucos*

The existing management measures are not sufficient to maintain the population of common sandpiper. Therefore additional actions are necessary (cp. HAMMER 2006, ZECHNER 2003 and POLLHEIMER n. d.):

- Limit of commercial rafting from 20th April to 1st July
- Prohibition of all other rafting, kayaking and hydrospeeding from the *Gesaeuseeingang* to *Gstatterboden* from 20th April to 1st July
- Prohibition to enter the visitor area *Johnsbachsteg* from 20th April to 1st July

- ♦ Fish species and 1098 Ukrainian brook lamprey *Eudontomyzon mariae*

→ Prohibition for entering shallow water from 1st April to 15th June (G. Unfer, in litt.; DIE BEWIRTSCHAFTER 2007, in litt.).

11.2 Nature trail zone

Negative impacts of nature trails on species should be kept as low as possible:

→ Screening of (new) constructions according Article 6 (Habitats' Directive)
→ Minimisation of negative impacts on species and habitats to an inevitable extent

11.2.1 Actions for sensitive habitats and species

- ♦ 1902 Lady's slipper *Cypripedium calceolus*

→ Intensified ranger controls during blossom along the *Sagenweg*

11.3 Hiking zone

- ✓ Marked hiking trails
- ✓ Environmental-friendly maintenance and repair of hiking trails (*Partnerschaftsuebereinkommen Nationalpark Gesaeuse, OEAV und Land Steiermark* 11. Juli 2003)
- ✓ Fairplay-folder: people are ask not to use hiking trails during dawn, dusk and nighttime

→ Order to walk dogs on leash only
→ Closing of shortcuts to reduce erosion
→ Daytime restrictions for the mountainbike tour *Hochscheibe*: 8 a.m. – 6 p.m.
→ Construction of a small foot path between willow dome and *Haindlkar* to complete the circular route *Haindlkar – Haindlkarhuetten – Gseng – Sagenweg – Willow dome – Haindlkar* (Screening according to article 6 of the Habitats' Directive, cp. EUROPÄISCHE KOMMISSION GD UMWELT 2001)
→ Biketour *Johnsbach*: meeting with tourism association to talk about further procedure (marking, marketing, etc.)

11.3.1 Actions for sensitive habitats and species

◆ Grouse

Hazel grouse, capercaillie and ptarmigan benefit from the order to walk dogs on leash only.

◆ A108 Capercaillie *Tetrao urogallus*

- *Gstatterboden*: daytime restrictions from April to May: entering of the courtship display area only after 9 a. m.
- *Goldeck* (far distance hiking trail *Lugauer - Sulzkaralm*): promotion of the alternative route via *Brunnstube* to the *Hartelsgraben* instead of the tour via Goldeck

11.4 Climbing zone

- Inventory of ascent and descent routes with evaluation of negative impacts on plants and animals (if necessary, modification of existing markings in co-operation with stakeholder)
- Possibilities for parking have to be checked
- No expanding of climbing routes

11.4.1 Actions for sensitive habitats and species

◆ A091 Golden eagle *Aquila chrysaetos*

- Eyries are controlled every year: if necessary, temporary prohibition of climbing within a perimeter of 300 m of the occupied nest (BRENDDEL et al. 2000)

11.5 Ski mountaineering zone

11.5.1 Ski mountaineering

◆ Ski mountaineering project

Ski mountaineering mainly occurs in the natural zone of the National Park. In 2004 – due to the increase of negative impacts caused by more and more skiers

- the National Park Ltd. initiated a project to improve the situation (K. Scheb). Within the project all relevant stakeholders were involved.

- ✓ Information panels at the starting points: *Gstatterboden/Pavilion*, *Gstatterboden/Gstatterbodenbauer*, *Johnsbach/Gscheidegger*, *Johnsbach/Ebner*, *Johnsbach/Koelblwirt*
- ✓ Marking of routes in sensitive areas, i. e. habitat of grouse species: *Gstatterboden*, *Gscheideggkogel* and *Zirbengarten* (cp. GEORGII & ELMAUER 2002, GRUENSCHACHNER-BERGER & PFEIFER 2005, 2006).
- ✓ Alternative route to the *Lugauer* (instead of crossing *Zirbengarten*)
- ✓ Folder 'Off-piste skiing in the Gesaeuse' with recommended routes

- Prohibition of dogs
- Daytime limitation in grouse courtship display grounds (*Gstatterboden*, *Gscheideggkogel*, *Huepfliingerhals/Zirbengarten*): no entering before 9 a. m. (cp. GRUENSCHACHNER-BERGER & PFEIFER 2005)
- Control of signs and markings; additional signs at the *Zirbengarten* and *Haselkar*; *Schroeckalm* and *Haindlschlag*)
- *Gscheideggkogel*: cutting of branches to improve the tour, signs with information on the snow condition of the route (*Ebner*, *Gscheidegger*)
- Enhanced ranger controls: *Huepfliingerhals* (heatable hut) and *Gscheideggkogel* (cp. LIECHTI et al. 2006, STEINER & PLATTNER 2006)
- Codex of considerate behaviour for leaseholders of Landesforste-huts
- Enhanced public relations with clear and short information (cp. HUNZIKER & ZEIDENITZ 2006, STREMLow & ERHART 2006, MEYER & JÄGGI 2006).

The information has to reach people before they come into the region, because they don't change their plans after choosing a route (FREULER et al. 2006). It is important to inform also skier, who are not organised within associations (WOLF & APPEL-KUMMER 2004).

- ♦ Meeting with mountain guide association (commercial mountain guides have to fulfil the guidelines of visitor management in the National Park)
- ♦ Presentations within information or educational events of mountain guide or alpine associations, etc.
- ♦ Information in specialist magazines (ski mountaineering, mountainbiking), and local press
- ♦ Information through producers or sellers of sporting goods
- ♦ Improvement of the National Park website: latest information on snow conditions of the routes
- ♦ Check of all homepages with ski mountaineering information, e. g., www.alpintouren.at, www.bergsteigen.at, and update according to the visitor management of the National Park

- ♦ Contact with publishers of literature on ski mountaineering routes (e. g., Schall, Sodamin, Jentzsch)

2009: prohibition of entering in sensitive areas, if the management measures do not work (cp. § 9 National Park plan)

11.5.2 Snowshoeing

→ Adaption of sign and marking of summer hiking trails in sensitive areas, e. g., *Gstatterboden*, *Gscheideggkogel*

11.5.3 Actions for sensitive habitats and species

- ♦ A091 Golden eagle *Aquila chrysaetos* and A104 Hazel grouse *Bonasa bonasia*
Both species benefit from concentration and marking of ski mountaineering routes.

- ♦ A108 Capercaillie *Tetrao urogallus*
Good signing and marking of the existing routes, which should cross the good capercaillie habitat as short as possible. The existing routes were optimised (cutting of trees and branches).

Gstatterboden: In case of decreasing numbers of capercaillie, translocation of the ski mountaineering route from the upper to the lower logging road (GRUENSCHACHNER-BERGER & PFEIFER 2006).

Gscheideggkogel: clear demarcation of the route (100 m on both sides of the marked ascent route).

- ♦ A409 Black grouse *Tetrao tetrix*
Zirbengarten – Huepfliingerhals: The alternative route to the *Lugauer* and the day time limitation at the Huepfliingerhals should calm these areas (see above).

Gscheideggkogel: The cutting along the route makes it possible to cross the habitat of black grouse as short as possible.

The non-marked route along the ridge to the *Leobner Toerl* or to the *Neuburgsattel* has to be prohibited.

♦ A408 Ptarmigan *Lagopus mutus*

Marking of routes to the *Stadlfeldschneid* and *Gsuechmauer* is necessary to concentrate disturbance within a small area.

♦ Deer species

Additional measures will be necessary after opening of overwintering enclosure in *Gstatterboden*: starting point only at the pavilion in *Gstatterboden*, adaption of the route (along the mountainbike route and an old trail).

11.6 Resource protection zone

- Amendment of the National Park law with the order to stay on the marked trails and routes in the whole National Park area (*Wegegebot*). Currently only prohibition of entering river bank and wetland area (§ 2 National Park plan) is given.

11.6.1 Hiking and mountainbiking

- No large-scale extension of the marked hiking trail network. Exception: construction of a small footpath between willow dome and *Haindlkar*, cp. 11.3. Screening of new or displaced hiking trails according to article 6 of the Habitats' Directive.
- Removal of illegal marks on hunting trails
- Prohibition of regularly used hunting trail Neuburg - Glanegg – Stadelfeldschneid – Hesshuetten by creating a blockade of cut mountain pine at the entrance (Neuburg).
- No extension of mountainbike network, except to the *Neuburg* alpine pastures (in case of the extension of the National Park area)
- *Enns* valley bike route: Screening according to article 6 of the Habitats' Directive is necessary (cp. EUROPÄISCHE KOMMISSION GD UMWELT 2001)

11.6.2 Mushrooming

- Amendment of the National Park law: The order to stay on the marked trails and routes in the whole National Park area (*Wegegebot*) leads to the prohibition of mushrooming off trails.

11.6.3 Caves

- ◆ 8310 Caves not open to the public

According to HERRMANN & STUMMER (2007):

- Removal of garbage and illegal marking (e. g., *Weiße Grotte*)
- Relocation of trails to climbing routes (*Grazer Weg – Tellersackcanyon*)
- No signing of caves
- Definition of general rules for entering caves

11.6.4 Aviation

- Meetings and workshops with the leaseholder of *Hesshuetten*, aviation clubs, as well as alpine and canyoning rescue associations to adjust transport and exercise flights (additional stakeholders should be included, e. g., *OEBB*, *WLV* and *Bundesheer*): agreement on the minimum flying altitude, flight routes, flight distance to occupied nests (for instance 1000 m in Bavaria), etc.
- Amendment of the National Park plan regulation: adjustment of the minimum flying altitude from 150 m to 600 m (cp. 8.11 Aviation).

11.6.5 Ski mountaineering

- No further spatial, temporal or quantitative extension of ski mountaineering (K. Scheb, in litt.)

11.6.6 Actions for sensitive habitats and species

- ◆ A091 Golden eagle *Aquila chrysaetos*, A103 Peregrine falcon *Falco peregrinus*, A408 Ptarmigan *Lagopus mutus* and A409 Black grouse *Tetrao tetrix*

Management actions concerning aviation will be helpful to reduce negative impact on habitat, hunting areas or occupied nests, respectively (cp. BRENDL et al. 2000, GEORGII & ELMAUER 2002).

11.7 Developed zone

11.7.1 Visitor facilities

Negative impacts of visitor facilities on species should be kept as low as possible:

- Screening of (new) constructions according Article 6 (Habitats' Directive)
- The nighttime illumination after 10 p. m. of the willow dome and other visitor facilities is switched off.
- The risk of collision for birds on glass buildings have to be reduced, i. e. at the pavilion.
- Use of existing building for visitor facilities, instead of the construction of new buildings and centres.

11.7.2 Camping ground

- More intensive advertising for the camping ground (with the possibility of camp fire) through ranger
- National Park parking places: signs (pictograms) with prohibition of camping, controls by rangers

11.7.3 Traffic

- Signs for motor bikers to reduce speed
- General limitation of speed (70 km/h) and tonnage (7.5 t) along the Enns valley road
- Development of a traffic guidance concept in co-operation with all relevant offices and stakeholders: shuttle busses, reduction of private traffic, etc.
- Construction of a parking place for disabled persons
- Improvement of parking place concept to reduce illicit parking

11.7.4 Logging roads

- Locking of gates (control by rangers), e. g., *Neuburg, Wag*, etc.
- Renaturation of logging roads, which are not needed for management activities (forest, wildlife, alpine pastures, etc.)

- Improvement of licence system for driving, e. g., leaseholders of refuges and *Landesforste*-huts, etc.

11.7.5 Huts

- codex of ecologically sound behaviour for leaseholders of *Landesforste*-huts and *Gofer* hut (self supporter hut)
- Improvement of transport to rented huts, e. g., in winter use of sledges instead of skidoo
- No clearing of snow on the trails towards the huts
- Refuges and regularly leased huts: adaption to state of the art, e. g., improvement of effluent disposal, etc. (*Partnerschaftsuebereinkommen* National Park Gesaeuse, OEAV und *Land Steiermark* 11. Juli 2003)

11.7.6 Actions for sensitive habitats and species

- ◆ A108 Capercaillie *Tetrao urogallus* and A409 Black grouse *Tetrao tetrix*

- Tagging of cables of material cable car to *Buchsteinhaus* and *Ennstaler Huette*.

Management zone/activity	Action	Area	Implementation by	Time period
River zone: Rafting	Amendment of the Navigation Regulation or the National Park law		NPG Ltd., Styrian Government	2010
	Check of all homepages on rafting, kayaking and hydrospeeding		NC	2008
River zone: Canyoning	Canyoning tours only within commercial all-inclusive-packages	<i>Bruckgraben</i>	NPG Ltd.	2008
	Fixed number of tours with day tickets		NPG Ltd.	2008
	Seasonal limitation of canyoning (only from July to October)		NPG Ltd.	2008
	Limitation of the number of canyoning rescue exercises, seasonal restrictions (only in August)		NPG Ltd.	2008
River zone: recreation at the river	Optimised sign-posting and demarcation of visitor areas and sensitive areas		NC, E	2008
	Closing of illicit parking places and footpaths	<i>Haselau, Finstergraben, Haindlkargraben, Schneiderwartgraben, Kainzenalbl</i>	NC, E, FW	2008
River zone: angling	Information by letter to members of the Casting Club on ecologically sound behaviour		NPG Ltd.	2008
	Limnological concept		NC	2009
	Actions for sensitive habitats and species: otter, common sandpiper, fish species and Ukrainian brook lamprey		NPG Ltd., Styrian Government	2010
Nature trail zone	Screening of (new) constructions according Article 6 (Habitats' Directive)	Whole NP	NPG Ltd., Styrian Government	2008
	Minimisation of negative impacts on species and habitats			
	Intensified ranger controls during blossom of Lady's slipper	<i>Sagenweg</i>	E	2007
Hiking zone	Order to walk dogs on leash only	Whole NP	NPG Ltd.	2008
	Closing of shortcuts to reduce erosion	e. g. trail to	E, FW	2008

Management zone/activity	Action	Area	Implement action by	Time period
		<i>Buchsteinhaus</i>		
	Daytime restrictions for the mountainbike tour <i>Hochscheibe</i> : 8 a.m. – 6 p.m.	Mountainbike tour <i>Hochscheibe</i>	NPG Ltd.	2008
	Construction of a small foot path	between willow dome and <i>Haindlkar</i>	NPG Ltd.	2009
	Meeting with tourism association <i>Johnsbach</i> to talk about further procedure of biketour (marking, marketing, etc.)	Biketour <i>Johnsbach</i>	NPG Ltd.	2008
	Actions for sensitive habitats and species: capercaillie	<i>Gstatterboden, Goldeck</i>	NC, E	2008
Climbing zone	Inventory of ascent and descent routes (if necessary, modification of existing markings in co-operation with stakeholder)		NC, FW	2008/09
	No expanding of climbing routes			
	Actions for sensitive habitats and species: golden eagle		NPG Ltd.	2008
Ski mountaineering zone	Prohibition of dogs	Whole NP	NPG Ltd.	2007
	Daytime limitation in grouse courtship playing ground: no entering before 9 a. m.	<i>Gstatterboden, Gscheideggkogel, Huepfliingerhals/Zirbengarten</i>	NPG Ltd.	2007
	Control of signs and markings, additional signs	<i>Zirbengarten</i> and <i>Haselkar</i> ; <i>Schroeckalm</i> and <i>Haindlschlag</i>	KS, FW	2007
	Cutting of branches to improve the tour	<i>Gscheideggkogel</i>	KS, FW	2007
	Enhanced ranger controls	<i>Gscheideggkogel, Huepfliingerhals/Zirbengarten</i>	KS, E	2007
	Codex of considerate behaviour for leaseholders of Landesforstehuts		NC	2007
	Enhanced public relations with clear and short information		NPG Ltd.	2007

Management zone/activity	Action	Area	Implementation by	Time period
	Prohibition of entering in sensitive areas, if the management measures do not work	<i>Zirbengarten, Gscheideggkogel</i>	NPG Ltd.	2009
Ski mountaineering zone: snow shoeing	Adaption of sign and marking of summer hiking trails in sensitive areas	<i>Gstatterboden, Gscheideggkogel</i>	KS?	2008
	Actions for sensitive areas: golden eagle, capercaillie, black grouse, ptarmigan, deer species		NPG Ltd.	
Resource protection zone	Amendment of the National Park law: Order to stay on the marked trails and routes (<i>Wegegebot</i>)	whole NP	NPG Ltd.	2009/10
Resource protection zone: hiking and mountainbiking	No large-scale extension of the marked hiking trail network	whole NP	NPG Ltd.	continuously
	Removal of illegal marks on trails	<i>E Tamischbachturm, Hinterwinkel, Planspitze-Seekar, Gofer, Fetzensteig</i>	KS	2008
	Prohibition of regularly used hunting trail <i>Neuburg - Glanegg - Stadelfeldschneid - Hesshuetten</i> through cutting of mountain pine at the entrance (<i>Neuburg</i>)	<i>Glanegg</i>	NPG Ltd.	2008
	No extension of mountainbike network, except to the <i>Neuburg</i> alpine pastures	Whole NP	NPG Ltd.	continuously
	<i>Enns</i> valley bike route: Screening according to article 6 of the Habitats' Directive is necessary		Styrian Government	
Resource protection zone: caves	Removal of garbage and illegal marking	e. g. <i>Weiße Grotte</i>	E	2008
	Relocation of trails to climbing routes	<i>Grazer Weg - Tellersackcanyon</i>	NC, FW	2008
	No signing of caves	whole NP		2008
	Definition of general rules for entering caves	whole NP	NC, FW	2008
Resource protection zone: aviation	Meetings and workshops with leaseholder of Hesshuetten, aviation clubs, as well as alpine and canyoning rescue associations to		NPG Ltd.	2008

Management zone/activity	Action	Area	Implementation by	Time period
	adjust transport and exercise flights			
	Amendment of the National Park plan regulation: adjustment of the overflight height from 150 m to 600 m	whole NP	NPG Ltd.	2009/10
Resource protection zone: ski mountaineering	No further spatial, temporal or quantitative extension of ski mountaineering	whole NP	NPG Ltd.	
Developed zone: visitor facilities	Screening of (new) constructions according Article 6 (Habitats' Directive)	Whole NP	NPG Ltd., Styrian Government	2008
	The nighttime illumination after 10 p. m. of the willow dome and other visitor facilities is switched off		NPG Ltd.	2007
	The risk of collision for birds on glass buildings have to be reduced, i. e. at the pavilion.		E, NC	2008
	Use of existing building for visitor facilities, instead of the construction of new buildings and centres.		NPG Ltd.	2008
Developed zone: camping ground	More intensive advertising for the camping ground (with the possibility of camp fire) through ranger		E	2008
	National Park parking places: signs (pictograms) with prohibition of camping, controls by rangers	whole NP	E, PR	2008
Developed zone: traffic	Signs for motor bikers to reduce speed	Enns valley road	E, PR	2008
	General limitation of speed (70 km/h) and tonnage (7.5 t)	Enns valley road	E	2009/10
	Development of a traffic guidance concept in co-operation with all relevant offices and stakeholders: shuttle busses, reduction of private traffic, etc.		NPG Ltd.	2010
	Construction of a parking place for disabled persons		NPG Ltd.	2009
	Improvement of parking place concept to reduce illicit parking		PR	2008
Developed zone: logging roads	Locking of gates (control by rangers)	e. g., Neuburg, Wag, etc.	E	2007
	Renaturation of logging roads, which are not needed for management activities (forest, wildlife, alpine pastures, etc.)	whole NP	NC, FW	2009
	Improvement of licence system for driving, e. g., leaseholders of	whole NP	NC, FW	2008

Management zone/activity	Action	Area	Implement action by	Time period
	refuges and Landesforste-huts, etc.			
Resource protection zone: huts	Codex of ecologically sound behaviour for leaseholders of Landesforste-huts and Gofer hut (self supporter hut)	whole NP	NC, FW	2007
	Improvement of transport to rented huts, e. g., in winter use of sledges instead of skidoo	Hochscheibe, Neuburg	FW	2007
	No snow clearance to huts	Hochscheibe, Neuburg	FW	2007
	Refuges and regularly leased huts: adaption to state of the art, e. g., improvement of effluent disposal, etc.	whole NP		2008-10
	Actions for sensitive habitats and species: capercaillie (tagging of cables of material cable car)	Buchsteinhaus, Ennstaler Huette	NC, FW	2008

Table 13. Planned management actions for each management zone including institution and time period of implementation. Departments of NP Ltd.: NC = Nature Conservation, E = Education, PR = Public relations, FW = Forest/Wildlife; KS = Karoline Scheb.

11.8 Excursions within the National Park programmes

In general excursions within the programmes of the National Park Ltd. are performed on marked trails and roads. Exceptions include specific projects, e. g., Waldlaeufercamp and ecological seminars, and are arranged in advance with the departments 'environmental education', 'nature protection' and 'forest/wildlife management' (part of the organisation manual of National Park Gesaeuse Ltd.).

Use of motor vehicles:

- In general, excursions within the educational programme of the National Park Ltd. are carried out without motor vehicles. Exceptions are arranged in advance with the departments 'environmental education', 'nature protection' and 'forest/wildlife management' (part of the organisation manual of National Park Gesaeuse Ltd.).
- Professional excursions should be done without motor vehicles, too. Each head of the departments decides on his responsibility the use of motor vehicles.
- If transport is necessary, only small busses (up to 20 persons) will be used. Big busses are not permitted any more on the logging roads in the National Park.
- Daytime limitation of transports by motor vehicles (8 a. m. to 6 p. m.)
- These regulations are applied to all departments of the Nationalpark Gesaeuse Ltd., the Styrian Provincial Forestry Commission, persons responsible for alpine pastures, etc.

11.8.1 Actions for sensitive habitats and species

♦ A108 Capercaillie *Tetrao urogallus*

The modus for excursions to capercaillies' courtship display will be changed in 2008 to reduce negative impacts (permanent hiding-places, longer observation period till 11 a. m.). In case of continuing disturbance within the following years, excursions will be stopped.

11.9 Events

11.9.1 National Park events

National Park events have to be organised as environmental-friendly as possible, this means:

- Avoidance of open fire, noise and non-essential illumination

- No open-air events in sensitive habitats during breeding time (March to July)

11.9.2 Events organised by different operators

The following measures are necessary:

- No additional events, no spatial and temporal extension of events
- Only traditional events are permitted (official permission is necessary)
- Environmental-friendly operation of events (waste disposal, etc.)
- No motor vehicle transports of people, transport of material is limited to necessary extent
- Locking of gates and additional controls of rangers during events

11.10 Commercial tour operators

First, meetings with mountain guides' association, rafting companies as well as other clubs and enterprises are necessary to discuss the conditions for commercial tours and visitor management regulations in the National Park.

- Mountain guides are only allowed to do mountain guides' tours and no nature educational programmes
- Winter: use only of recommended routes (see folder 'Off-piste skiing in the National Park Gesaeuse')
- Summer: use of marked routes only for commercial tours
- check of all homepages of commercial tour operators in the Gesaeuse, e. g., www.alpinschule-peilstein.at, and update according to the visitor management of the National Park

11.11 Training of National Park employees and rangers

- ✓ Monthly newsletter for rangers by P. Sterl

- Regular training of National Park employees and rangers is necessary to improve the awareness of National Park aims and purposes. It is important to inform colleagues on latest news and activities.

11.12 Public relations and communication

11.12.1 Information panels and infopoints

- ✓ Information panels (information points) at the strategic good positions with different information on National Park philosophy, offers, landscape, nature protection, etc.

- Clearer information on general rules, orders and prohibitions in the National Park, e. g. pictograms (ZEIDENITZ & HUNZIKER 2006):
- Big panels for sensitive areas (Din A1)
- Clear information on visitor areas

11.12.2 Rangers' controls and personal information

- ✓ Rangers' controls and personal information since 2004

- Improvement and enhancement of the controls (cp. 11.1 River zone, 11.5 Ski mountaineering zone)

11.12.3 National Park journal and folder

The National Park journal 'Im Gseis' with considerable information on National Park management, habitats and species, education, National Park programmes and events, etc. is released two times per year.

One imagefolder with general information was printed in 2007. One time per year the folders on summer-, winter-, and school-programmes, willow dome and pavilion are up-dated.

Flyers are also available on the mountainbike tour 'Hochscheibe', on watersports 'On the water in the National Park Gesaeuse' and ski mountaineering 'Off-piste skiing in the Gesaeuse'.

Two 'fairplay'-booklets on ecologically sound behaviour in the National Park (summer/winter) were designed within the LIFE-project.

11.12.4 Homepage

The homepage with information in general, on programmes and events, on projects, research, LIFE-project and National Park partners as well as on data of the meteorological station, etc. is updated permanently. Also, all journals,

reports and folders are available as download. Latest information on snow conditions of the ski mountaineering routes will be provided in the next winter. Interesting links should be included (e. g., www.natursportinfo.de, cp. STREMLow & PÜTSCH 2006).

11.12.5 Multivisions and films

The National Park Ltd. develops multivision presentations on general information, aims and management measures of the National Park permanently. Different films and documentations on the National Park were already shot.

11.12.6 Workshops and training

- ✓ Annual training of rafting guides

→ Training and workshops within already existing events for mountain guides, mountain rescue associations, etc.

11.12.7 'National Park comes into the region'

- ✓ National Park Ltd. is member of the tourism association
- ✓ National Park employees as participants in the 'Zukunftskonferenz', which worked out a mission and vision with concrete projects for the region
- ✓ Enterprise partner project of the National Park, cp. www.nationalpark.co.at/nationalpark/en/region-partnerbetriebe.php?navid=27)
- ✓ Co-operation with the monastery of Admont (common activities and events: *Klostermarktage*, etc.)
- ✓ Open day

→ Target-group-specific public relations
 → Jobs: promotion of local people
 → National Park as initiator for tourism activities
 → Promotion of social and socio-economical studies
 → Co-operation and common activities with local associations

12 INDICATORS, STANDARDS AND MONITORING

Within this concept a first draft of a monitoring plan is included. It will be completed and improved within the next two years. For this, different stakeholders and experts will be involved.

An overview of indicators, possible standards and monitoring aspects is found in Table 14.

12.1 River zone

12.1.1 Alpine rivers and the herbaceous vegetation along their banks (3220)

Annual check along the river banks of Enns and *Johnsbach* to control the conservation status is necessary (cp. KAMMERER 2003a, b).

12.1.2 Ground beetles

Qualitative and quantitative survey of ground beetle species should happen every 10 years according to PAILL (2005).

12.1.3 Common sandpiper *Actitis hypoleucos*

The annual survey of breeding population and reproduction success of common sandpiper along the *Enns* and *Johnsbach* has to be proceeded. Data are already available since 2003 (ZECHNER 2003, HAMMER 2006).

12.1.4 Visitor surveys

Visitor surveys should bring data on the numbers of visitors at the one hand, and data on recreation quality on the other hand. Different methods may be used (cp. ARNBERGER et al. 2006), depending on the purpose of the study, e. g., interviews, direct observations or census with cameras, video, aerial photographs, etc., mechanic census (turnstile, revolving door, etc.), electronic census (light barriers, motion detector, thermal or pressure sensor, etc.), self registration (summit logs, etc.) and tracks of use (garbage, erosion, damage of vegetation, etc.).

Census of visitors in the *Bruckgraben*, in visitor areas (*Johnsbachsteg*, camping ground *Forstgarten*, *Johnsbach Kainzenalblgraben*) and sensitive areas is necessary to control acceptance of management actions. The census can be done by rangers 2008 and 2009. It should be continued afterwards biennially.

The census of boats was continued in 2007 (3 weekdays, 3 weekend-days) with the same methodology than 2005. It has to be proceeded biennially.

12.1.5 Efficiency of management actions

Direct observations and census of visitors in sensitive sectors of the Enns and *Johnsbach*, e. g., *Haselau*, *Finstergraben*, *Haindlkargraben* und *Schneiderwartgraben*, is necessary to estimate the impact of tourist use in this area. High priority must have a census of canyonists in the *Bruckgraben*, supported by video survey.

Breaches of the National Park's directives have to be documented very properly and standardised by rangers to analyse areas of conflict and acceptance of visitor management actions.

12.1.6 Pollution by garbage and feces

At visitor areas and other places (e.g., *Schneiderwartgraben*) the survey of garbage, feces and toilet paper will be necessary during the next years (cp. ΑΙΚΟΗ 2006), because pollution may reduce recreation quality in this zone. It is necessary to know which places may be affected by this problem.

12.2 Nature trail zone

12.2.1 Lady's slipper *Cypripedium calceolus* (1902)

To monitor the conservation status of this species, annual controls along the *Sagenweg* are necessary in May to June (cp. PRENNER 2005).

12.2.2 Common sandpiper *Actitis hypoleucos*

Cp. River zone

12.2.3 Visitor surveys

Mechanic or electronic census of visitors along the *Lettmairau* nature trail would be easy to realise and necessary to know about the visitor numbers.

Crowding: Census of visitors has to be accompanied by interviews on crowding together with additional questions on place of residence, socio-economical facts, outdoor recreation quality, motivation to come to the National Park, duration of stay, activities in the area, satisfaction with offers of the National park, acceptance of visitor management activities, observation of wildlife, etc. It has to be repeated every 5 years.

12.3 Hiking zone

12.3.1 Speikboeden

Speikboeden (*Zinoedl*, *Sparafeld*, *Admonter Kalbling*) should be surveyed every 10 years (cp. RAMMO et al. 2006) to observe the development of this habitat type. They were studied by GREIMLER (1991) for the first time.

12.3.2 Erosion

Currently, no data exist on erosion along hiking trails. After a first survey it can be decided whether management measures are necessary (cp. PETTEBONE et al. 2006). Erosion may be given in the areas of *Rotofen*, *Gseng*, *Oedsteinkar*, *Tamischbachturm*, *Zinoedl*, *Planspitze* and partly along the trail to the *Hesshuetten* (D. Kreiner, oral information).

12.3.3 Trampling

Data on trampling are not available, currently. Therefore, a first survey has to be conducted to estimate, whether and where the problem may exist (cp. KANGAS et al. 2006). Trampling may also have negative effects on visitor experiences, which should be proved within the visitor surveys (interviews).

12.3.4 Birds of annex I Birds' Directive

Annual census of capercaillie and ptarmigan (number of courtship displaying cocks) as well as golden eagle (control of eagle eyries) should help to evaluate the impact of hiking on these species. The survey of indirect proofs (feathers, droppings) of capercaillie will be conducted every ten years (cp. HAUBENWALLNER 2006).

12.3.5 Visitor surveys

Visitor numbers: Data on visitor numbers on hiking trails or on the mountainbike tour *Hochscheibe* are not available, currently.

Automatical census of visitors along the mountainbike tour and on selected hiking trails, e. g. *Johnsbach – Hesshuetten*, *Gstatterboden – Buchsteinhaus*, *Gstatterboden – Ennstaler Huetten* or on the main peaks (*Großer Buchstein*, *Tamischbachturm*, *Hochtor*, *Zinoedl*), respectively, will be conducted to get first information on visitor numbers, carrying capacity and possible impacts on sensitive habitats and species (cp. ITEN & SIEGRIST 2006, PETTEBONE et al. 2006).

Crowding: cp. Nature trail zone. First interviews were held in 2007 and have to be continued in the next years on trails with high intensity of use.

12.4 Climbing zone

12.4.1 Birds of annex I Birds' Directive

Within this zone, monitoring of rock breeding birds, i. e. golden eagle, peregrine falcon and eagle owl, has to be conducted annually.

12.4.2 Visitor surveys

Data on intensity of use for different routes are not available, currently. Therefore, census on selected routes, parking places and the control of climbing route logs should be started.

12.5 Ski mountaineering zone

12.5.1 Birds of annex I Birds' Directive

Annual census of capercaillie, black grouse and ptarmigan (number of courtship displaying cocks) as well as golden eagle (control of eagle eyries) should help to evaluate the impact of ski mountaineering on these species. The survey of indirect proofs (feathers, droppings) of capercaillie will be conducted every ten years (cp. HAUBENWALLNER 2006).

In addition, studies on the level of stress hormone could be combined with surveys on intensity of use, e. g., aerial photographs on skiing trails (ARLETTAZ et al. 2007, V. Gruenschachner-Berger, oral information).

12.5.2 Visitor survey

Data on the number of skiers are not available except results of a first random sampling in 2007. Data on intensity of use are necessary to assess the development of visitor numbers. First census should be started at the Gscheideggkogel, Huepfliingerhals, and in the area of *Stadelfeld-schneid*/Gsuechmauer.

Crowding: cp. Hiking zone

12.5.3 Efficiency of management actions

Management activities in this zone will be only successful, if the number of skiers is almost zero in sensitive areas, i. e. *Zirbengarten*, *Gscheideggkogel*. Arlettaz (2007) has shown that already a small number of skiers leads to an increase of stress hormones of black grouse. Only the total calming of the areas may bring the expected, positive effect on grouse populations.

Therefore, controls of visitors' behaviour at the Gscheideggkogel and *Huepfliingerhals*, as well as the acceptance of the alternative route to the *Lugauer* have to be conducted and documented standardised.

12.6 Resource protection zone

12.6.1 Caves not open to public (8310)

According to HERRMANN & STUMMER 2007) the following controls are necessary:
Baerenhoehle: Annual control, if necessary more often.
Steinkarhoehle and *Wildschuetzenhoehle*: regular controls
 Caves affected by garbage: regular controls by mountain guides.

12.6.2 Marmot

The population of marmot should be monitored every five years to observe changes of the number and age structure according to SCHMOTZER (2007). In addition, studies on parasites have to be conducted to evaluate the impact of parasites and sickness on the population size.

12.6.3 Visitor surveys

Because of the indication, that the number of people at the hunting trail 'Glanegg' is increasing, census of intensity of use by direct observation (ranger) or automatically systems (digital camera, cp. CAMPBELL 2006) is necessary. Results will be a basis for estimating negative impacts on ptarmigan, marmot and chamois.

12.7 Developed zone

12.7.1 Visitor surveys

Data on visitor numbers at the willow dome and geology exhibition in the pavilion are available and data collection has to be proceeded.

12.7.2 Satisfaction of visitor on recreation quality

Interviews on the satisfaction of visitors with visitor facilities in the National Park will be helpful to improve tourist offers and programmes. This can be done by questionnaires on each visitor facility.

12.7.3 Pollution by garbage and faeces

Cp. River zone.

12.8 National Park programme

12.8.1 Satisfaction of visitors

Interviews on the satisfaction of visitors in general, or on the National Park programmes and events in particular will be helpful to improve offers and programmes for tourists. This can be evaluated by questionnaires for each event and excursion.

Additional questions may include acceptance of nature protection management actions, crowding, etc.

General information on residence, motivation to come into the region, duration of stay and activities in the area, may be obtained through questionnaires within the general tourism statistical fact sheets.

Management zone	Study area	Indicator	Standard	Methodology	Time period and interval	P	Implementation
River zone	<i>Gesaeuseeingang, Haselau, Johnsbach mouth, Finstergraben, Haindlkargraben and Schneiderwartgraben</i>	CS Alpine rivers and the herbaceous vegetation along their banks	Current situation or improvement	check of river banks (cp. KAMMERER 2003a, b)	Annual	1	NC
	<i>Haselau, Johnsbach mouth</i>	Ground beetles	Current situation or improvement	Qualitative and quantitative survey (cp. PAILL 2005)	Every 10 years	2	NC
	<i>Gesaeuseeingang, Haselau, Johnsbach mouth, Finstergraben, Haindlkargraben und Schneiderwartgraben</i>	Common sandpiper	Current situation (2005) or improvement	Census of population incl. breeding success (cp. ZECHNER 2003, HAMMER 2006)	Annual	1	NC
	<i>Bruckgraben, visitor and sensitive areas</i>	Number of visitors, number of boats	Bruckgraben: <50 visitors per year	Census of visitors in visitor areas (direct observation); census of boats; census of canyonists in the Bruckgraben* (automatically census)	2008, 2009, afterwards biennially	2 *1	E
	<i>Gesaeuseeingang, Haselau, Johnsbach mouth, Finstergraben, Haindlkargraben und Schneiderwartgraben</i>	Efficiency of management actions	No infringements of directives	Direct observation	2008, 2009, afterwards biennially	1	E
	<i>Visitor areas, Haindlkargraben,</i>	Pollution by garbage and faeces	No garbage and faeces	Direct controls	2008, afterwards	3	E

Management zone	Study area	Indicator	Standard	Methodology	Time period and interval	P	Implementation
	<i>Schneiderwartgraben</i>				biennially		
Nature trail zone	<i>Sagenweg</i>	CS Lady's slipper	Current situation or improvement	Monitoring according to PRENNER (2005)	Annual	1	E (R)
	<i>Johnsbach</i>	Common sandpiper	Cp. River zone				
	<i>Lettmairau</i> nature trail	Number of visitors	Real carrying capacity (cp. KANOJE 2006)	Mechanic or electronic census of visitors	2008, 2009, afterwards biennially	3	E (R)
		Crowding	90 % of visitors don't feel crowded	Questionnaires	2008, 2009, afterwards every 5 years	3	E (R)
Hiking zone	<i>Zinoedl, Sparafeld and Admonter Kalbling</i>	Speikboeden	Current situation or improvement	Vegetation inventory (cp. GREIMLER 1991)	Every 10 years	3	NC
	<i>Rotofen, Gseng, Oedststeinkar, Tamischbachturm, Zinoedl, Planspitze, partly along trail to Hesshuetten</i>	Erosion	<i>Determination after first survey</i>	Inventory of erosion (analysis of aerial pictures, field inventory)	Every 5 – 10 years	2	NC, E (R)
	Along all hiking trails	Trampling	<i>Determination after first survey</i>	First survey	Every 5 years	3	NP Gesaeuse Ltd.
	<i>Gstatterbodener Kessel, Zinoedl, Lugauer, Stadelfeldschneid – Gsuechmauer,</i>	CS birds of annex I (capercaillie, ptarmigan, golden eagle)	Current situation or improvement	Census of courtship displaying cocks; control of golden eagle eyries; survey of indirect proofs of	annual (indirect proof every 10 years)	1	NC, FW

Management zone	Study area	Indicator	Standard	Methodology	Time period and interval	P	Implementation
	area around <i>Hesshuetten</i>			capercaillie			
	Mountainbike route, selected hiking trails	Number of visitors	<i>Determination after data collection</i>	Automatical census	2008, 2009, afterwards biennially	2	NC, E (R)
	Trails with high intensity of use	Crowding	90 % of visitors don't feel crowded	Questionnaires, cp. Nature trail zone	2008, 2009, afterwards every 5 years	2	E (R)
Climbing zone	Breeding rocks	CS birds of annex I (golden eagle, peregrine falcon, eagle owl)	Current situation or improvement	Control of nests	Annual	1	NC
	Selected routes	Visitor numbers	<i>Determination after data collection</i>	Automatical census	2008, 2009, afterwards biennially	3	NC, E (R)
Ski mountaineering zone	<i>Zirbengarten, Huepfliingerhals, Gscheideggkogel, Stadelfeldschneid</i>	CS birds of annex I (golden eagle, hazel grouse, capercaillie, black grouse, ptarmigan)	Current situation or improvement	Census of courtship displaying cocks and control of golden eagle nests; survey of indirect proofs of capercaillie	Annual (indirect proof every 10 years)	1	NC, FW
	<i>Huepfliingerhals, Gscheideggkogel, Stadelfeldschneid</i>	Number of visitors	Zirbengarten: 0	Automatical census	2008, 2009, afterwards biennially	1	NC, E (R)
		Crowding	90 % of visitors don't feel crowded	Questionnaires, cp. Nature trail zone	2008, 2009, afterwards every 5 years	2	E (R)
	<i>Zirbengarten,</i>	Efficiency of	Zirbengarten:	Direct observations	2008/09,	1	NC, E, FW

Management zone	Study area	Indicator	Standard	Methodology	Time period and interval	P	Implementation
	<i>Gscheideggkogel</i>	management actions	Number of infringements of directives max. 1x per week		afterwards every two years		
Resource protection zone	<i>Baerenhoehle, Steinkarhoehle, Wildschuetzenhoehle</i>	CS Caves not open to public	No garbage or other signs of use	Controls on garbage or other signs of use	Regular (every 3 – 5 years)	2-3	E (external ÖGH)
		Population of marmot	Current situation or improvement	Direct observations	Every 5 years	2	NC, FW
	<i>Glanegg</i>	Number of visitors	5 persons per weekend	Automatic census (e. g. digital camera)	Every 5 years	1	NC, E
Developed zone	Willow dome, geological exhibition	Number of visitors	Not necessary	Visitor census (automatic or manual)		2	E (R)
		Satisfaction of visitors (including crowding, etc.)	90 % of visitors are satisfied	Questionnaires		2	E (R)
	Parking places <i>Schneiderwartgraben</i>	Pollution by garbage and faeces	Cp. River zone				

Table 14. Overview on indicators, standards and monitoring aspects for each management zone. CS = conservation status, P = Priority. Departments of NP Ltd.: NC = Nature Conservation, E = Education, P = Presentation, FW = Forest/Wildlife; KS = Karoline Scheb, R = Ranger..

13 CHECKLIST FOR A VISITOR MANAGEMENT PLAN

This checklist roughly follows the steps of VERP (U.S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE 1997) by using the checklist of PROEBSTL et al. (2007) and the contents of POMEROY et al. (2004). Furthermore, EAGLES et al. (2002) and 'A handbook for practitioners' of Eurosite (www.eurosite-nature.org/IMG/pdf/mp_guidance_jul04.pdf) was taken into account.

In the following text, PA is used as abbreviation of "protected area".

13.1 Getting started

What is the aim of the management plan and why do you produce one?

Who will use the management plan?

What area is to be included within the plan?

How will the preparation process begin and how will it be managed?

How much time is necessary for the process (timetable)?

What period should the management plan cover?

What length and structure should the management plan have?

13.2 Interdisciplinary project team

Who should be involved in the preparation of the management plan?

Who will develop the plan?

Who should write the management plan?

Who will implement the plan?

Which consultants (backgrounds, expertise) may be needed?

13.3 Public involvement strategy

Which groups and actors should participate?

Have you identified the relevant stakeholders?

Have you identified local key persons?

At which state will you include stakeholders?

(When) will you involve the following local players and representatives:

- ◆ PA planners and managers
- ◆ PA employees, free lancers and volunteers
- ◆ PA visitors
- ◆ Landowner (in and around the area)
- ◆ Residents (in and around the area)
- ◆ Local communities
- ◆ Government ministries
- ◆ Nature conservation administrations

- ◆ Forestry administrations
- ◆ Hunters and/or hunting associations
- ◆ Tourism associations
- ◆ Accommodation providers
- ◆ Sport clubs and associations
- ◆ Less organised sport men, e. g. climbers, mountain bikers
- ◆ Tour operators and mountain guides
- ◆ Educational institutions
- ◆ Non-governmental organisations
- ◆ Interested public
- ◆ Media, etc.

Have you considered a suitable way of inviting stakeholder?

Have you chosen adequate tools for the participation of different stakeholders?

Have you established working arrangements with key stakeholders?

Have you thought of the restraints that keep stakeholder away from meetings?

Is there the possibility to combine participation session with other events?

Have you used an appropriate language to explain the management plan to non-experts?

Have you used visualization strategies (maps, etc.)?

Have you considered local differences? (e.g. separate meetings for communities, stakeholders)

Have you identified the state of knowledge and attitude of the stakeholders concerning the category of PA (e. g., National Park, Natura 2000)?

13.4 Statements of PA purpose and significance

13.4.1 Purpose statements

Do concrete statements of purpose exist and do they articulate the reasons for the existence of the PA?

Are the statements of purpose specific to the PA?

Is the statement of purpose grounded in PA legislation, or other formal designations?

Are the statements of purpose understood and accepted by all participants (planners, PA staff, and the public)?

Has the PA purposes changed over time?

13.4.2 Significance statements

Do the significance statements define the overall significance of the PA?

Do the significance statements help to set PA priorities?

Are the significance statements PA-specific?

Were experts involved who know and understand the PA resources, in order to develop accurate and useful significance statements?

Did you consult the PA enabling legislation and associated history, documentation in support of special designations (such as a National Park, world heritage site or biosphere reserve, etc.), research reports, and experts?

Were all participants (planners, PA staff, and the public, etc.) involved in writing them and/or have input in refining them?

Are the significance statements understood and accepted by all participants?

13.5 Goals and objectives for visitor management

How do you set goals and objectives?

Are there concrete management goals and objectives for the site?

Are objectives clearly identified and justified?

Have you reviewed all plans, documents and other relevant sources of information to identify the goals and objectives?

Have you listed the overlapping goals and objectives?

13.6 Basic data of PA legislation, tourism and resources

Where can you get information?

Who are the important persons, who can give information on the site and its specific features?

Are existing plans (e.g. development plan, management plan, forest plans, land use plans) available?

Are existing base data (studies, statistics, papers, etc.) available?

Are secondary data available (e.g. permits, entrance tickets)?

Are the data available in GIS? Are there mappings of the area?

Which quality do the data have?

Are there deficits in the existing data?

Do you need additional data?

Are there additional investigations necessary?

13.6.1 Legal data

What categories of protection are within the area?

Which different laws and EU directives affect the area or cover nature protection and tourism, respectively?

Which additional legal requirements have to be considered?

13.6.2 Data on tourism and infrastructure

What is the region's (tourism) vision?

What economic importance do tourism and recreation have for the region and for local communities?

Which market segments are interesting for your PA?

Which kind of tourism utilisation plays a role in the PA and in the region?

What are the key attractions in the region, especially those typically included in PA visitor itineraries?

Who are the target groups concerning recreation and tourism in the region/in the PA?

What is the structure of the tourism association of the region?

Who is the responsible person for the development of tourism?

Is there a co-operation between local tourism experts and the PA?

Did you talk to local tourism experts?

Are there any existing data on visitor use and intensity in the PA and in the region?

Do you have data on tourism, e. g.,

- ◆ number of overnight stays
- ◆ restaurants, inns, pubs and hotels
- ◆ visitor centres
- ◆ exhibitions
- ◆ hiking trails with intensity of use
- ◆ ski mountaineering routes with intensity of use
- ◆ nature trails with intensity of use
- ◆ registrations in summit logs
- ◆ registrations in climbing tour logs
- ◆ visitor numbers, and how they change
- ◆ visitors' activities and length of stay, etc.
- ◆ motivation of visitors to come into the region

Do you have data on infrastructure, e. g.

- ◆ roads and streets
- ◆ volume of traffic on roads and streets,
- ◆ parking places
- ◆ dirt roads (logging-roads, etc.)
- ◆ public transport (railway, bus, taxi) with stops and stations
- ◆ cablecars, ski-lifts, etc.
- ◆ trails
- ◆ visitor information centres
- ◆ benches, tables, picnic-areas
- ◆ points of interest, etc.

13.6.3 Data on resources

Are there local experts for specific species and habitats?

What natural features make the area important?

Do you have data on

- ◆ the distribution, abundance and conservation status of habitats and species according to the annex I and II of the Habitats' Directive,
- ◆ the distribution, abundance and conservation status of bird species according to the annex I of the Birds' Directive
- ◆ the distribution, abundance and conservation status of additional endangered and/or sensitive habitats or species (e.g. common sandpiper)

13.7 Visitors' experience and activities

Have you identified all relevant recreational and tourism uses in the PA?

Which types of activities (e.g. hiking, ski mountaineering, rafting, etc.) exist in the PA and where are they practised mainly?

Where are the different visitor facilities (e.g. parking sites, nature trails, buildings, visitor centres) located?

Which differences in standards and/or functions of the facilities (e.g., paved and dirt roads; surfaced trails, visitor centres, administration buildings) in the PA do exist?

Have you identified all important points of interest (e.g. sights, huts, viewpoints...) in the PA?

Where are the activity nodes and hotspots in the PA?

Which levels, timing, and seasonality of visitor use exist?

What programmes, excursions and events do you offer in the PA for visitors?

Have you considered future conditions, development and plans in the PA?

What about tourism development external to the PA (e.g., roads and trails, land ownership, existing activities)?

13.8 Impact assessment and risk analysis for sensitive habitats and species

Are there any existing data on visitor impacts in this PA?

Have you considered all recreational and touristy activities and their impacts?

Did you evaluate all impacts recreation and tourism have on the species, habitats and additional sites (size of habitat loss, other losses over the year, evaluation of impact, etc.)?

Have you identified a spatial overlapping of distribution of habitats/species and visitors' activities, and where?

Have you considered the most sensitive time range of species and habitats (breeding season, start of the vegetation period)?

Have you identified and considered peak times of tourism and recreational activities?

Which habitats and species of the Natura 2000 standard data form are affected, deteriorated or disturbed by tourism and recreational activities, and where?

Which additional species, habitats or sites are sensitive to human use and are affected by tourism activities, and where?

How important are impacts resulting of recreational use?

Do you miss data?

Do you need additional investigations?

13.8.1 Risk analysis

Are there local experts with knowledge on habitats and species?

Did you check the conservation status of the species/habitats according to the Natura 2000 standard form?

Have you defined the relevance of each touristy activity for each habitat/species?

Did you check the sensitivity of all species and habitats for all activities according to the matrix (cp. Table 2, page 23)?

Have you identified the intensity of use for each activity in different areas of the PA?

Did you consider the positive effects which visitor management measures may bring already to the site (efficiency of management measures)?

Have you identified the intensity of spoiling according to the matrix (cp. Table 3)?

Have you identified the risk for each habitat/species according to the matrix taking into consideration the sensitivity and the intensity of spoiling (cp. Table 4)?

13.9 Management zones and areas of conflict

13.9.1 Management zones

How are zones defined?

Which zones can you define?

Do you have data for each zone on

- ◆ boundaries of the zone
- ◆ natural resources
- ◆ accessibility and touristy activities
- ◆ quality of visitor experience
- ◆ intensity of use
- ◆ management activities and infrastructure
- ◆ potential for development

- ♦ objectives and purposes of management

13.9.2 Areas of conflict

Have you identified and considered hotspots of tourism and recreational activities?

Have you identified the most sensitive areas in the PA?

Have you identified the areas of conflicts (spatial and/or temporal overlapping of tourism and distribution of sensitive species/habitats)?

13.10 Indicators

How do you select indicators?

Who does select indicators?

Have you consulted scientific literature, experts and the public?

Have you applied management judgements (e. g., of PA planners and managers)?

Have you considered best-practice examples of other PAs?

13.10.1 Relevant indicators to the PA goals and objectives

Have you identify the indicators that match to your list of goals and objectives?

Have you done a list of relevant indicators?

Have you considered indicators on resource conditions, e. g., population size of threatened species, damage through trampling?

Have you considered socio-economic and tourism indicators, e.g. visitor numbers, crowding, etc.)

13.10.2 Each indicator

Do you have the information for each indicator:

- ♦ goals and objectives the indicator corresponds with,
- ♦ brief description of the indicator,
- ♦ purpose and rationale of the indicator and
- ♦ methods and resources (people, equipment) needed to collect and analyse the information.

Is the indicator measurable, precise, consistent, sensitive and simple?

Is the indicator specific? Does the indicator define specific circumstances?

Is the indicator objective? Are indicator variables measured in absolute, unequivocal terms?

Is the indicator reliable and repeatable?

Is the indicator directly related to at least one of the visitor use attributes, e. g., levels of use, types of use, timing of use, location of use, or behaviour of visitors?

Is the indicator sensitive to visitor use over a relatively short period of time?

Do the indicators show minimal variability based upon fluctuations in the environment?

Do the indicators response to a range of conditions? Does it show a gradient in conditions, due to the impacts of visitors or management actions.

Is the indicator resilient? Is it responsive to management actions and does it help to determine their effectiveness?

Is the indicator significant? Is it important for defining the basic integrity of resource condition and the quality of the visitor experience?

Can the indicators be monitored within a large time frame (e.g., through the year or through a visitor use season)?

How do you collect the data? Which method and approach do you use to collect information?

How difficult is the indicator to measure?

Do you have already baseline data?

How to analyse and interpret the results?

What are the results and how can it used by the PA?

How useful is the indicator in general and what problems may occur in using the indicator?

Do you know an example of use of the indicator?

Did you consider useful references and internet links with suggested sources of information on methods, and further explanation of the indicator?

13.10.3 Review and prioritise the indicators identified

Have you reviewed each indicator?

Have you determined the feasibility of measuring the indicators identified?

Have you prioritised them, if it is not feasible to measure all indicators?

Have you completed the list of selected indicators?

Have you identify how the selected indicators relate to one another?

13.11 Standards

Who is involved in the development of standards?

How do you work out the standards?

Do the standards focus directly on the impacts that affect the quality of the visitor experience or resource condition, not the management action used to keep impacts from exceeding the standards?

Are the standards quantitative?

Do the standards incorporate a time-or space-bounded element which expresses both how much of an impact is acceptable and how often such impacts can occur?

Do the standards include a tolerance for some percentage?

Do the standards reflect conditions that are attainable?

What are the effects of standards on specific user groups?

13.12 Monitoring plan and implementation

How will the effectiveness of the management measures undertaken be assessed?

Have you identified all management questions to be answered by the monitoring?

Which indicators should be monitored regularly?

In which areas should the monitoring and the investigations go on?

13.12.1 Methods

Have you chosen adequate methods and the appropriate sampling approach for the surveys?

Have you studied and understood the data collection methods?

Have you familiarised yourself with the best practices and principles for collecting data in the field?

Have you considered which indicators have similar methodologies, such as a survey that could be used for several indicators?

Have you considered which of the methods are already included in existing monitoring programmes at the PA?

If you use questionnaires: Are the questions plain and clearly expressed (especially important if the visitors have to fill out the questionnaires by their own)?

Is the modelling of data necessary, and if yes, have you chosen the adequate model and is the data collection adjusted to the modelling?

13.12.2 Resources for monitoring

Have you identified the necessary resources (e.g. staff, financial resources) for your survey?

How much budget will be needed for evaluation (costs of the evaluation team's time, consultant and training costs, equipment, etc.)?

How many people will be required?

Do you have enough personnel to collect data?

What level of skills and training is necessary?

Will the personnel be able to learn quickly how to monitor the indicator?

Who is member of the evaluation team, which is responsible for planning, implementation and initial analysis?

Which staff or non-staff will conduct the evaluation (external consultants or organisations with the necessary expertise)?

Who will lead the evaluation?

What are the responsibilities of each team member based on their skills and experience?

Did you brief the personal properly?

Do you have co-operations with other institutions, universities, etc.?

How and when should stakeholders be involved?

What equipment is needed to measure and analyse selected indicators? Do you have the equipment?

Do you consider that you maybe need spare parts for technical counting devices or additional batteries?

13.12.3 Timeline

Did you determine the amount of time needed for each indicator?

Have you determined when the data need to be collected?

Can each member of the evaluation team complete his activities within the timeline?

Have you considered factors such as seasonality and frequency?

Have you considered that due the weather the implementation of some monitoring methods is maybe not possible at a certain date (e.g. recording of aerial photos is not possible if the cloudiness is too high) and that you have to fix enough alternative dates?

Are there time restrictions (natural events or social time constraints)?

Will the data be collected at the same time to ensure comparability over time?

13.12.4 Collection of data

Did you make a field inspection in the investigation area to check the conditions there?

Have you ensured that everything is in place for data collection?

Are there new or changing logistic needs (local travel, lodging, meals, access to telephone, e-mail communications, etc.)?

Have you considered the weather conditions in the investigation area and make sure that the equipment is protected against weather and vandalism?

Have the resource been made available (access to necessary finances and equipment)?

Do you have the necessary permits, approvals, permissions, etc.?

13.12.5 Management of collected data

Who will be the data manager?

How will collected data be submitted to the data manager?

Have you coded the data?

Do you have a system for storing and entering the data?

Have you reviewed the data set?

Have you determined how to make the data available for analysis and sharing?

13.12.6 Analysis of the collected data

Do you have the equipment (software, types of infrastructure, etc.) and the knowledge to analyse the collected data?

How and by whom are the collected data analysed/processed?

Have you reviewed the questions being answered by the evaluation?

Have you completed the preliminary analysis?

Have you determined and prepared analyses?

Have you captured and prepared results?

Will you check the data collected and the methods to ensure that they make sense?

Are the data reliable? If no: Have you determined the source of error (e.g. human or sample) and have you adjusted the evaluation plan?

What will you do, if the results of the evaluation are not useful?

Will you resume the data collection?

Did you complete the evaluation results with other information about the PA in the decision making process?

Have you encouraged peer review and independent validation of results?

Will you review priority goals and objectives, whether they are really important to the PA? Will you revise them as needed?

Will you review indicators that were selected to ensure that they match the most important goals and objectives? Will you revise them as needed?

Will you return to the evaluation plan and revise it according to adjusted and/or new data collection needs?

13.12.7 Communication and implementation

Have you developed a strategy and a timeline for delivery of results?

Have you determined which format to use to provide evaluation results and to reach the target audience most effective?

Who are the potential target audiences that may benefit from or be interested in the evaluation results of the PA?

Which of these audiences are internal stakeholders in the PA management?

What level of influence and interest do they have over the PA and how it is managed?

What, specifically, do you expect each audience to do with the results and information you present to them?

What do you know about their preferred method of receiving information? E.g. do they prefer to read information or listen to a radio or television? Do they use the internet regularly? Do they gather together periodically at meetings or conferences? What language does the audience speak? What is their average educational level? What style of communication do they prefer?

How important is it for you to stay in communication with each audience?

13.13 Management actions

Have you considered already existing infrastructure and management actions that maybe have an influence at the intensity of touristy use (e.g. existing information boards, etc.)?

What are the solutions to the threats and problems identified within the evaluation?

Did you use the results of the evaluation to adapt management strategies?

Have you prioritised management actions?

Are there strategies to achieve each objective?

Is there sufficient legal power to implement the strategies?

Is the PA zoned for management purposes?

Are all goals and objectives achieved fully? If no: Will you review and adjust PA management practices?

Are you prepared to make changes in management?

Have you found mechanism to make changes?

Have you elaborate these management actions in a participatory manner, such as holding workshops with different stakeholder groups?

Do stakeholders own the plan and assist with its implementation?

Did you communicate the planned actions?

Did you consider possibilities to 'advert' sustainable recreational use through stakeholders, e.g., alpine associations?

14 CONCLUSION

This visitor management concept follows the steps of the Visitor Experience and Resource Protection Framework (U. S. Department of Interior – National Park Service 1997). Although the legal, natural and infrastructural conditions are different to U.S. conditions, the VERP Framework was selected because it seems to be the best applicable framework for the current situation in the National Park Gesäuse taking into consideration the other frameworks, e.g., VAMP, VIM, LAC, TOMM (LOCKWOOD et al. 2006). Because of these preconditions and because of missing data the framework had to be adapted. This concept follows the VERP-framework only partly and may be taken as a draft, which should be completed after the collection of detailed data.

14.1 Public involvement strategy

Participation plays a key role within this concept. Until now, stakeholders except of the employees of the National Park Gesäuse Ltd. and the Styrian Provincial Forestry Commission, were not involved. The interdisciplinary team decided first to work out a draft for the concept and to involve additional stakeholders afterwards. The strategy for the involvement of stakeholders, communities, user and other groups has to be developed in autumn 2007/spring 2008 and will be part of a general evaluation process.

Participation will be necessary for the following topics, most notably:

River zone:

- ◆ Amendment of the Navigation Regulation
- ◆ Canyoning rescue exercises
- ◆ Communication with internet providers (homepages on rafting, canyoning, etc.)

Climbing zone:

- ◆ Inventory of ascent and descent routes (e. g., modification of routes if necessary)

Ski mountaineering zone:

- ◆ Meeting with mountain guide association (cp. WASEM & MOENNECKE 2006)
- ◆ Communication with internet providers (e. g., www.alpintouren.at, www.bergsteigen.at)
- ◆ Contact with publisher of books on ski mountaineering routes

Resource protection zone:

- ◆ Amendment of the National Park law: Order to stay on the marked trails and routes in the whole National Park area.
- ◆ Meetings and workshops with stakeholders with regard to aviation to adjust routes, frequencies and altitudes of flights (INGOLD 2005, U. Brendel, in litt.).

- ◆ Amendment of the National Park plan regulation: adjustment of the minimum flight altitude from 150 m to 600 m (cp. 8.11 Aviation).

Commercial tour operators:

- ◆ Meetings with mountain guides' associations, rafting companies as well as other clubs and enterprises.

14.2 Basic data

Basic data are missed for many sectors. Whereas, data for resources, e. g., data on distribution and conservation status of Natura 2000 habitats and species, are partly available, data are lacking totally on visitor numbers, carrying capacities and visitor experience.

In the following years one main task for the National Park will be the collection of data on visitors' numbers, motivation to come to the National Park, visitors' satisfaction with the offers of the National Park, etc. Concerning data on resources, the check of erosion and trampling along hiking trails will be one important part of data collection. In addition, surveys for Natura 2000 habitats and species have to be improved. Currently, the conservation status of some habitats and species is not clear (see p. 34).

14.3 Visitor experience and resource conditions

Data on the intensity of use are missing for all activities in the National Park. Therefore, within this management concept these numbers were estimated only and classified in coarse categories. For a detailed analysis of the visitors' use and flows concrete data are necessary (HENNIG 2007, HEINRICHS 2007).

14.4 Impact assessment and risk analysis

The conservation status was estimated according to ELLMAUER (2005a,b,c). Because of the unclear conservation status of some habitats and species (cp. 6.3 Resources (sensitive habitats and species) and missing data on the intensity of use this risk analysis is mainly a simplified evaluation of potential risks for Natura 2000 habitats and species as well as other characteristic and/or sensitive habitats and species due to tourism activities. It has to be reviewed after the update and completion of data. Differences in seasonal and daytime use have to taken into account.

14.5 Management zones and areas of conflict

Management zones were designed only roughly by building a buffer around the trails and roads. They have to be analysed in more detail by including new and additional data. For instance, visitor nodes and hotspots as well as differences in intensity of use due to relief and rocks have to be taken into consideration (HENNING 2007, HEINRICHS 2007).

14.6 Management actions

Currently, only management actions concerning the protection of resources, i. e. sensitive habitats and species, are being worked out. The weak legal basis makes it difficult to set concrete rules. To improve the visitor management actions the amendment of at least three regulations or laws, respectively, is necessary (Navigation Regulation, National park law to stay on marked trails, and National Park plan regulation concerning minimum flight altitude).

Because of the lack of data concerning the visitors' experience and questions of crowding, management measures for visitors can be undertaken only after surveys and interviews of visitors.

14.7 Indicators, standards and monitoring

Monitoring is an essential part of each management process (EAGLES et al. 2002). To evaluate the efficiency of management measures, monitoring of sensitive species and habitats as well as the control of measures are necessary. Survey of population trends is needed to estimate the conservation status (cp. ZEITLER 2001). At the same time monitoring of visitor and their behaviour has to be evaluated, e. g., changes in the use of several routes, etc.

It is necessary to work out a scientific and professional monitoring plan (EAGLES et al. 2002, within which aims and purpose, indicators, methodology of surveys and analysis of data as well as aspects of implementation should be included. In addition, regular documentation and data administration have to be taken into consideration. In recent years simulation models have become more and more important (z. B. POE et al. 2006, TACZANOWSKA et al. 2006).

This concept includes first suggestions for indicators and standards as well as a draft of the monitoring plan. Indicators and standards for the visitor management in the National Park are going to be worked out within the next years (2008 und 2009). In addition to the core team, experts are going to be involved into this process, during which the draft for the monitoring of resource and social indicators is going to be concretised as well. The detailed results on the elaboration of indicators, standards and monitoring plan are going to be part of the after-LIFE-management plan. The management actions have to be adapted taking into account the results of monitoring.

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15.2 Internet Resources

Alpine convention: <http://www.cipra.org/en/alpenkonvention>

Birds' Directive:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31979L0409:EN:HTML>

Eurosite: http://www.eurosite-nature.org/IMG/pdf/mp_guidance_jul04.pdf

Federal environmental agency:

http://www.umweltbundesamt.at/umweltschutz/naturschutz/natura_2000/gez/

Habitats' Directive :

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML>

Impact on foraging deer species:

<http://www.bfn.de/natursport/test/SportinfoPHP/infosanzeigen.php?sportart=Tourenskilauf&z=Sportart&code=g67&lang=de#auswirkungen>

Legislation information system: <http://www.ris.bka.gv.at/lr-steiermark/>

National Park Gesaeuse: <http://www.nationalpark.co.at>

Minimum altitude of overflights: http://www.bfn.de/0323_aba.html

National Park Gesaeuse: <http://www.nationalpark.co.at/>

National Park Gesaeuse partners:

<http://www.nationalpark.co.at/nationalpark/en/region-partnerbetriebe.php?navid=27>)

Neosporosa:

http://www.lgl.bayern.de/veterinaer/hundeparasit_neospora_caninum.htm

Styrian Government: <http://www.stmk.gv.at>

Traffic load:

[http://gis2.stmk.gv.at/da3/\(54j51kqn30g0fe55e1ayi3ap\)/init.aspx?kartensammlung=verkehr&Karte=verkehrsbelastung&Massstab=1200000](http://gis2.stmk.gv.at/da3/(54j51kqn30g0fe55e1ayi3ap)/init.aspx?kartensammlung=verkehr&Karte=verkehrsbelastung&Massstab=1200000)

Xeismobil: <http://www.xeismobil.at>

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16 APPENDIX

16.1 Legal basis

A summary on the legal basis for the National Park Gesaeuse is found in RIEMELMOSER & MUELLER (2003). The most important laws, edicts and directives for visitor management are listed below.

16.1.1 Birds' and Habiats' Directive

The designation of Natura 2000 sites is based on the Birds' and Habitat's Directives. Most important parts of articles of these two directives are listed below (cp. CEC 2000, ZANINI 2004, GLATZ et al. 2007).

Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds

(eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31979L0409:EN:HTML)

ARTICLE 1

1 . THIS DIRECTIVE RELATES TO THE CONSERVATION OF ALL SPECIES OF NATURALLY OCCURRING BIRDS IN THE WILD STATE IN THE EUROPEAN TERRITORY OF THE MEMBER STATES TO WHICH THE TREATY APPLIES . IT COVERS THE PROTECTION , MANAGEMENT AND CONTROL OF THESE SPECIES AND LAYS DOWN RULES FOR THEIR EXPLOITATION .

ARTICLE 2

MEMBER STATES SHALL TAKE THE REQUISITE MEASURES TO MAINTAIN THE POPULATION OF THE SPECIES REFERRED TO IN ARTICLE 1 AT A LEVEL WHICH CORRESPONDS IN PARTICULAR TO ECOLOGICAL , SCIENTIFIC AND CULTURAL REQUIREMENTS , WHILE TAKING ACCOUNT OF ECONOMIC AND RECREATIONAL REQUIREMENTS , OR TO ADAPT THE POPULATION OF THESE SPECIES TO THAT LEVEL .

ARTICLE 4

1 . THE SPECIES MENTIONED IN ANNEX I SHALL BE THE SUBJECT OF SPECIAL CONSERVATION MEASURES CONCERNING THEIR HABITAT IN ORDER TO ENSURE THEIR SURVIVAL AND REPRODUCTION IN THEIR AREA OF DISTRIBUTION .

IN THIS CONNECTION , ACCOUNT SHALL BE TAKEN OF :

(A) SPECIES IN DANGER OF EXTINCTION ;

(B) SPECIES VULNERABLE TO SPECIFIC CHANGES IN THEIR HABITAT ;

(C) SPECIES CONSIDERED RARE BECAUSE OF SMALL POPULATIONS OR RESTRICTED LOCAL DISTRIBUTION ;

(D) OTHER SPECIES REQUIRING PARTICULAR ATTENTION FOR REASONS OF THE SPECIFIC NATURE OF THEIR HABITAT .

TRENDS AND VARIATIONS IN POPULATION LEVELS SHALL BE TAKEN INTO ACCOUNT AS A BACKGROUND FOR EVALUATIONS .

MEMBER STATES SHALL CLASSIFY IN PARTICULAR THE MOST SUITABLE TERRITORIES IN NUMBER AND SIZE AS SPECIAL PROTECTION AREAS FOR THE CONSERVATION OF THESE SPECIES , TAKING INTO ACCOUNT THEIR PROTECTION REQUIREMENTS IN THE GEOGRAPHICAL SEA AND LAND AREA WHERE THIS DIRECTIVE APPLIES .

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

(eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML)

Article 2

1. The aim of this Directive shall be to contribute towards ensuring bio-diversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the Member States to which the Treaty applies.

Article 3

1. A coherent European ecological network of special areas of conservation shall be set up under the title Natura 2000. This network, composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, shall enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.

The Natura 2000 network shall include the special protection areas classified by the Member States pursuant to Directive 79/409/EEC.

Article 6

1. For special areas of conservation, Member States shall establish the necessary conservation measures involving, if need be, appropriate management plans specifically designed for the sites or integrated into other development plans, and appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the natural habitat types in Annex I and the species in Annex II present on the sites.
2. Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive.
3. Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.
4. If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to

beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

Article 23

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive within two years of its notification. They shall forthwith inform the Commission thereof.

16.1.2 National Park Gesaeuse Law (2002)

This law includes the establishment, the conservation regulations as well as the operation of the National Park. The annex includes the IUCN criteria for protected areas category II.

§ 2 Ziele

Ziel der Errichtung ... ist es, ein Schutzgebiet zu schaffen, in dem der Ablauf der natürlichen Entwicklungen auf Dauer sichergestellt und gewährleistet wird, dass

1. die naturbelassenen Teile mit ihrer charakteristischen Tier- und Pflanzenwelt erhalten werden,
2. anthropogen beeinflusste Bereiche sich zur Naturlandschaft entwickeln können und, wo erforderlich, in ihrer Entwicklung gefördert werden,
3. die naturnahe Kulturlandschaft durch zeitgemäße Bewirtschaftung erhalten bleibt und auch weiterhin gepflegt werden kann,
4. die ökologischen und sozioökonomischen Zusammenhänge in diesem Gebiet zum Schutz der Natur und zum Wohl der Menschen erforscht werden,
5. die Erlebbarkeit des Gebietes für den Menschen zum Zweck der Bildung und der Erholung ermöglicht wird.

§ 5 Nationalparkplan

(3) Der Nationalparkplan beschränkt sich auf die zur Zielerreichung erforderlichen Maßnahmen

(4) Im Nationalparkplan sind insbesondere Maßnahmen festzulegen zur naturnahen Entwicklung des Naturraumes und der Biotopausstattung Erhaltung und Entwicklung eines an den Lebensraum angepassten Wild- und Fischbestandes und Sicherung der Erlebbarkeit des Gebietes.

§ 8 Schutzbestimmungen

(1) In der Natur- und Bewahrungszone ist, soweit in den folgenden Bestimmungen nicht Abweichendes geregelt ist, jede Beeinträchtigung des Naturhaushalts, der Tier- und Pflanzenwelt und des Landschaftsbildes untersagt, die den Zielen des § 2 widerspricht.

(2) In der Natur- und Bewahrungszone sind gestattet:

1. Maßnahmen, die zur Umsetzung des Nationalparkplans erforderlich sind,
2. das Befahren von nicht öffentlichen Straßen mit Kraftfahrzeugen durch Anrainer, zur rechtmäßigen Ausübung der Land- und Forstwirtschaft, der Jagd und Fischerei sowie zu nationalparkbezogenen Zwecken,
3. der Betrieb, die Wartung, Instandhaltung und Instandsetzung behördlich genehmigter oder sonst rechtmäßig bestehender Anlagen,
4. das Sammeln von Pilzen und Beeren.

(3) Im Nationalparkplan sind, soweit dies mit den Zielen gemäß § 2 vereinbar ist, für die Naturzone Ausnahmen vom Verbot des Abs. 1 vorzusehen für

1. das Reiten auf und das Befahren von Grundflächen mit Fahrzeugen abseits von Straßen und Radwegen,
2. den Betrieb von Luftfahrzeugen in weniger als 2500 m Seehöhe,
3. das Begehen von Höhlen,
4. das Bergsteigen, Wandern, Klettern, den Tourenschilauf und Wassersport.

(4) In der Bewahrungszone sind gestattet

1. die in Abs. 3 aufgezählten Tätigkeiten,
- ...
5. Zu- und Umbauten bestehender Gebäude, sofern diese die Schutzziele des § 2 nicht beeinträchtigen und die Wiedererrichtung von für die Almbewirtschaftung erforderlichen Objekten und Anlagen.

16.1.3 Edict of the Styrian Government on the National Park plan (2003)

This edict regulates resource protection as well as alpine pastures' management. It includes guidelines for visitor management.

§ 1 Fauna und Flora

- (1) Zum Schutz der charakteristischen Pflanzenwelt des Nationalparks ist es untersagt, wild wachsende Pflanzen oder Teile davon zu pflücken oder zu beschädigen, ausgenommen zu Zwecken des Alm- und Waldmanagements. Ausgenommen von diesem Verbot ist ferner das Sammeln von Pilzen und Beeren bis zum Ausmaß von zwei Kilogramm pro Person und Tag.

§ 2 Naturraum Gewässer

- (1) Zum Schutz und zur Erhaltung der Lebensräume im Bereich stehender, fließender sowie unterirdischer Gewässer einschließlich der mit diesen in einem räumlichen Zusammenhang stehenden Feuchtbiotope ist das Betreten dieser Gebiete abseits von markierten Wegen und Steigen oder gekennzeichneten Stellen untersagt.
- (2) Der Verkehr mit motorgetriebenen Wasserfahrzeugen und Schwimmkörpern mit Maschinenantrieb ist untersagt.

§ 3 Höhlen und geologische Formationen

- (1) In der Naturzone ist das Begehen von Höhlen untersagt. Ausgenommen von diesem Verbot ist das Begehen zu wissenschaftlichen Zwecken.

§ 4 Wald

- (4) Die im Gebiet des Nationalparks bestehenden Forststraßen sind von den Wegehaltern/Wegehalterinnen in Ausmaß und Zustand nur insoweit instand zu halten, als dies für den Betrieb des Nationalparks sowie für die Ausübung von Rechten und Tätigkeiten im Sinn des § 8 Stmk. NPG erforderlich ist.

§ 5 Wild

- (1) Die Nationalparkverwaltung hat zur Förderung autochthoner Wildarten und deren Erlebarmachung für den Menschen nach wildökologischen Grundsätzen und unter

Bedachtnahme auf die Nachbarreviere ein Wildschutzkonzept zu erstellen und umzusetzen.

(2) Mindestens die Hälfte des Nationalparkgebietes muss ganzjähriges Wildruhegebiet sein. Im Wildruhegebiet haben jegliche Regulierungsmaßnahmen, wie insbesondere Wildstandsregulierungen und Fütterungen, zu unterbleiben.

§ 6 Wassertiere

(1) Der gewerbliche Fang sämtlicher Wassertiere ist untersagt. Die nicht gewerbliche Angelfischerei und die Entnahme von Wassertieren zu wissenschaftlichen Zwecken ist nur mit Zustimmung der Nationalparkverwaltung gestattet.

(3) Das Betreten von Laichgebieten ist nur mit Zustimmung der Nationalparkverwaltung gestattet.

Besucher/Besucherinnen

§ 8 Allgemeines

(1) Die Information, Lenkung und Betreuung von Besuchern/Besucherinnen erfolgt mit dem Ziel, deren Wissen um natürliche Prozesse und das Verständnis für Schutzmaßnahmen zu fördern. Das Erleben der Bergwelt des Nationalparks für den Menschen erfolgt durch eine naturverträgliche alpinistische Nutzung.

(2) Die Erreichbarkeit und der Zugang zum Nationalpark zu Fuß, mit dem Fahrrad und öffentlichen Verkehrsmitteln sind zu fördern, wobei in sachgerechter Weise die Interessen körperbehinderter Menschen berücksichtigt werden sollen.

(3) Auf Nationalparkflächen ist das Halten und Parken von Kraftfahrzeugen abseits gekennzeichneten Flächen untersagt.

(4) Durch geeignete Maßnahmen, wie die Bereitstellung eines attraktiven Informations-, Bildungs- und Erholungsangebots, ist die Bereitschaft der Besucher/Besucherinnen zu naturverträglichem Verhalten zu fördern.

(5) Gewerbliche Aktivitäten auf dem Gebiet des Nationalparks, insbesondere Begehungen mit Gruppen über sechs Personen, dürfen nur mit Zustimmung der Nationalparkverwaltung durchgeführt werden.

(6) Auf Nationalparkflächen sind sportliche Wettkampfveranstaltungen untersagt. Traditionelle Wasser- und Schisportbewerbe bedürfen einer Bewilligung nach § 9 Stmk. NPG.

§ 9 Alpines Gelände

Die Nationalparkverwaltung hat in Abstimmung mit den Wegehaltern/Wegehalterinnen unter Beachtung ökologischer Erfordernisse ein alpines Wegekonzept zu erstellen und Wege, Klettersteige, Kletterrouten, Schitourenrouten sowie Gebiete, die auf Grund ökologischer Erfordernisse dauernd oder zeitlich befristet nicht betreten werden dürfen, zu kennzeichnen.

§ 10 Radfahren

Das Befahren nicht öffentlicher Wege oder Grundflächen mit Fahrrädern ist nur im Bereich gekennzeichneten Routen zulässig.

§ 11 Reiten

Das Reiten auf nicht öffentlichen Wegen oder Grundflächen und das Befahren mit Fuhrwerken ist nur im Bereich gekennzeichneten Routen zulässig.

§ 12 Befahren mit Booten

Eine Befahrung der Enns mit Booten und Rafts ist im Rahmen der schifffahrtsrechtlichen Bestimmungen zulässig.

§ 13 Flugsport

(1) Das Überfliegen des Nationalparks ist im Rahmen der luftfahrtrechtlichen Bestimmungen zulässig, wobei die in diesen Bestimmungen enthaltene Mindestflughöhe von 150 Metern einzuhalten ist.

(2) Abs. 1 gilt in sinngemäßer Anwendung auch für nicht dem Luftfahrtgesetz unterliegende Flugsportarten.

§ 14 Motorsport

Die Ausübung des Motorsports, insbesondere Motocross und Rallye-Fahrten, sind auf der gesamten Fläche des Nationalparks untersagt.

16.1.4 National Park Ranger Law (2003)

This law regulates the purpose, function, nomination and qualification, task and duties of National Park rangers.

§ 6 Aufgaben und Pflichten

(1) Nationalparkorgane haben folgende Aufgaben:

1. Information der Bevölkerung über die Ziele des Nationalparks, deren Umsetzung und Mitwirkung an anderen Maßnahmen der Bewusstseinsbildung für die Notwendigkeit des Schutzes der Natur und
2. Überwachung der Einhaltung der Bestimmungen des Nationalparkgesetzes Gesäuse sowie der im Nationalpark geltenden Bestimmungen des Steiermärkischen Naturschutzgesetzes.

§ 7 Befugnisse

Nationalparkorgane haben folgende Befugnisse:

1. das Recht in Ausübung ihres Dienstes die zum Nationalpark gehörenden Grundstücke zu betreten;
2. Anhaltung von Personen, die sie bei Begehung einer Verwaltungsübertretung nach dem Nationalparkgesetz Gesäuse antreffen, zum Zweck der Feststellung der Identität und Erstattung von Anzeigen;
3. Aussprechen von Ermahnungen;
4. Beschlagnahme von Verfallsgegenständen gemäß § 14 Abs. 4 des Nationalparkgesetzes Gesäuse und § 39 VStG und Durchsuchung von Fahrzeugen und Behältnissen von angehaltenen Personen nach solchen Verfallsgegenständen;
5. Ausstellung von Organstrafverfügungen nach Maßgabe des § 50 VStG.

16.1.5 Nature conservation Law of Styria (1976 + amendments)

The nature conservation law rules the general and specific protection of nature and landscape, including e. g., nature and landscape protection areas, protection of water and river banks, nature parks and natural monuments, European protected areas (Natura 2000 sites). Within this law the Habitats's and Birds' Directives are assembled (www.ris.bka.gv.at/lr-steiermark/).

16.1.6 Edict of designation Natura 2000 site Nr. 17 „Ennstaler Alpen/Gesaeuse“, October 2006

§ 2 Schutzzweck

Der Schutzzweck des Gebietes liegt in der Erhaltung oder Wiederherstellung eines günstigen Erhaltungszustandes von Schutzgütern nach der Fauna-Flora-Habitat-Richtlinie sowie nach der Vogelschutz-Richtlinie.

16.1.7 Edict on navigation regulations in the Enns (2003)

§ 2

(1) Das Befahren des in § 1 beschriebenen Gewässers [30 m oberhalb von Eisenbahnbrücke bis zur Wehranlage Gstatterboden] mit Rafts, welche zur Beförderung von mehr als 3 Personen geeignet oder zugelassen sind, ist verboten.

(2) Befahren des in § 1 beschriebenen Gewässers mit Fahrzeugen und Schwimmkörpern mit Maschinenantrieb ist verboten

§ 3 – Ausnahmen

Das Verbot des § 2 gilt nicht für:

...

3. Raftingfahrten im Rahmen einer Konzession vom 1. Mai bis 15. Oktober jeden Jahres von 9.30 bis 17.30 Uhr. Die Anzahl der im Rahmen einer Konzession verwendeten Rafts ist mit 40 beschränkt.

16.1.8 Forest law (1975 + amendments)

Benützung des Waldes zu Erholungszwecken

§ 33 Arten der Benützung

(1) Jedermann darf, ..., Wald zu Erholungszwecken betreten und sich dort aufhalten.

...

(3) Eine über Abs. 1 hinausgehende Benutzung, wie Lagern bei Dunkelheit, Zelten, Befahren oder Reiten, ist nur mit Zustimmung des Waldeigentümers ... zulässig.

16.1.9 Law concerning the permission of cross-country walking in mountainous areas *Gesetz, betreffend die Wegefreiheit im Berglande* (1922)

§ 3 Das Ödland oberhalb der Baumgrenze ... ist für den Touristenverkehr frei und kann von jedermann betreten werden, ...

§ 6 Wer durch groben Unfug (Schreien, Johlen, Trompetenblasen, Schießen, Ablassen von Steinen, Feuermachen und dergleichen) die Ruhe in Wald und Flur stört ... sowie wer Wegweiser, Markierungszeichen, Zäune und dergleichen beschäftigt ... ist von der Bezirksverwaltungsbehörde mit einer Geldstrafe bis zu 72 Euro zu bestrafen.

16.1.10 Law on cross country vehicles (1973)

This law is not valid within the National Park, but affects all areas within the Natura 2000 site apart from National Park, e. g., Niederscheibe, Neuburg:

§2 (3) Dem Verbot nach Abs. 1 (Die Verwendung von Geländefahrzeugen ist, soweit in Abs. 2 und 3 und im § 10 nicht anderes bestimmt ist, verboten.) unterliegt nicht die Verwendung von Geländefahrzeugen mit Ausnahme von Motorschlitten für Fahrten

- a) im Rahmen der Bewirtschaftung land- und forstwirtschaftlicher Grundstücke,*
- b) im Rahmen der Jagd*

D. h. Es muss um eine Ausnahmegewilligung angesucht werden (§ 4 *Ausnahmegewilligungen*).

Ausnahmegewilligungen werden nur für bestimmte Zwecke erteilt, z. B. Errichtung, Erhaltung und Betrieb von Aufstiegshilfen bzw. Fremdenverkehrsunternehmen und allgemein zugänglichen Touristenschutzhütten, wenn kein anderes Verkehrsmittel zur Verfügung steht.

Weiters werden Ausnahmegewilligungen nur erteilt, wenn öffentliche Interessen, wie Schutz des Lebens und der Gesundheit von Menschen und Tieren, Schutz der Natur, insbesondere die Erhaltung der Lebensgrundlagen für Tiere und Pflanzen etc., nicht erheblich beeinträchtigt werden.

16.1.11 Additional law and regulations

Additional laws affecting the National Park are for instance the Law on natural caves, hunting law, fishery law, etc. (Riemelmoser & Mueller 2003).

16.1.12 IUCN criteria

A National Park, Category II, is defined as a natural area of land and or sea, designated to:

- a) protect the ecological integrity of one or more ecosystems for present and future generations
- b) exclude exploitation or occupation inimical to the purposes of designation of the area and
- c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

16.1.13 Alpine convention

The Alpine Convention is an agreement between various countries for the protection and sustainable development of the Alpine Region. It was signed on November 7th, 1991 in Salzburg (Austria) by Austria, France, Germany, Italy, Liechtenstein, Switzerland and the EU. Slovenia signed the Convention on March 29th, 1993. Monaco became a party on the basis of a separate additional protocol. The Convention came into force on March 6th, 1995 (www.cipra.org/en/alpenkonvention).

The Alpine Convention is an agreement within the law of nations for the overall protection and the sustainable development of the Alps. It was set up upon the initiative and after long preliminary work by CIPRA. The general framework convention, which in the meantime has been ratified by all the contracting parties, is applied by means of the so called Protocols of Implementation. The protocols of implementation are designated for twelve sectors, and protocols already exist for nine sectors, e. g. conservation of nature and the countryside, tourism, etc.

16.2 Available GIS-data (July 2007)

- **Tourism**

Information centre *Admont*

Pavilion

Willow dome

information points

Nature trail *Lettmairau*

Visitor areas

Rafting: entry and exit site, rafting route

Canyoning route *Bruckgraben*

Hiking trails, including intensity of use (3 classes)

Peaks

Mountainbike route *Hochscheibe*

Climbing routes plus ascents and descents, including intensity of use (3 classes)

Ski mountaineering routes, including intensity of use (3 classes)

Sledging route

Restaurants

Overnight stays

Overnight stays (refuges)

- **Hydrology - geology**

Caves

Springs

- **Habitats' Directive, annex I**

Habitats overview (Pauli et al. 1997)

Habitat in detail (*Johnsbach, Enns, Almen*)

- **Annex II Habitats' Directive**

Bats

Otter

Longhorn beetle (*Rosaria alpina*)

- **Annex I Birds' Directive**

Golden eagle nests

Woodpecker species (*Gstatterboden*)

Red-breasted flycatcher

Capercaillie: summer habitat, courtship display areas, indirect records, habitat quality (winter, HSI)

Black grouse: summer habitat, courtship display areas, indirect records, habitat quality winter

Ptarmigan *Stadlfeldschneid* and *Zinoedl*: displaying cocks, indirect records

- **Hunting**

Roe deer: summer habitat

Chamois: summer and winter habitat

Red deer: summer habitat

Zonation hunting

- **Additional species**

Records of lamprey

Records of common sandpiper

Distribution of marmot

- **Infrastructure**

Railway including stations

Roads

Logging roads

Buildings

- **Basic data**

Austrian Map 1:50.000

Austrian Map 1:200.000

Aerial photographs

National park

Planning area National Park

Natura 2000 site

Natural and Conservation zone

Digital elevation model

16.3 Caves in the National Park (Conservation status B)

No.	Cave	Altitude	Location
1644/001	<i>Kuehloch</i>	1.800	Western side of <i>Tamischbachturm</i>
1711/006	<i>Bachwirthnische</i>	596	W <i>Johnsbach</i> mouth, at the road
1711/028	<i>Kluftnische</i>	680	<i>Turmstein</i>
1712/001	<i>Huettenhoehle</i>	1.670	NE <i>Ennseck</i>
1712/007	<i>Sattelschacht</i>	1.600	<i>Stadlalm</i>
1712/015	<i>Butterbruendlhoehle</i>	1.445	<i>Ebnesangeralm</i>
1712/018	<i>Weißer Grotte</i>	1.600	<i>Gamsstein</i>
1712/019	<i>Kleiner-Oedstein-Canyon</i>	1.530	Southern wall of <i>Kl. Oedstein</i>
1712/021	<i>Dachlgipfelschacht</i>	2.175	Southwestern side of <i>Dachlgipfelkuppe</i>
1712/054	<i>Schneekarturm-Halbhoehle</i>	1.820	Southeastern side of <i>Schneekarturm</i>
1712/071	<i>Wildschuetzenhoehle</i>	1.450	
1713/002	<i>Rotofenhoehle</i>	1.800	<i>Rotofen</i> , western side
1713/007	<i>Jahrlingmauerhoehle</i>	1.403	<i>Jahrlingmauer</i>
1714/001	<i>Baerenhoehle</i>	1.230	<i>Hartelsgraben</i>
1714/003	<i>Lugauer Gipfelschacht</i>	2.170	SW <i>Lugauer</i> peak
1714/004	<i>Unterstandshoehle</i>	2.050	<i>Polster</i> - <i>Lugauer</i> NE-peak
1714/010	<i>Ennseckhoehle</i>	950	<i>Ennseck</i> , western part
1714/012	<i>Goldeckgipfelhoehle</i>	1.260	Western part of <i>Goldeck</i>

16.4 Routes for excursions within the National Park programme

Rauchboden trail

Hiking tour along trail no. 608

Hiking tour along the *Rauchboden* trail from railway station *Johnsbach* to *Gstatterboden*, or vice versa.

'Sagenweg'

Hiking tour along trail no. 608

Hiking tour along the *Sagenweg*, starting at restaurant *Bachbrücke* going to *Johnsbach*, or vice versa.

Lettmairau nature trail

One hour hiking tour along the *Lettmairau* nature trail.

Koelblalm

Hiking tour from *Ebner (Johnsbach)* to the *Koelblalm*, ascent on the hiking trail and descent along the logging road, passing the gorge.

Sulzkaralm

Hiking tour along trail no. 601

Hiking tour for one day from *Hartelsgraben* to the *Sulzkaralm* and back. More days: continuation via *Sulzkarhund* to *Hesshuetten*.

Hesshuetten

Hiking tour along trail no. 601 E4

All-day hiking tour from *Johnsbach* to the *Hesshuetten* and back. More days: descent via *Sulzkaralm* to the *Hartelsgraben*, or back to *Johnsbach*.

Haindlkarhuetten

Hiking tour along trail no. 658

Hiking tour to the *Haindlkarhuetten* and back.

Ennstaler Huetten

Hiking tour along trail no. 646 or 608, respectively

Hiking tour to the *Ennstaler Huetten*, starting at *Gstatterboden*, and back.

Buchsteinhaus

Hiking tour along trail no. 641

Hiking tour to the *Buchsteinhaus*, starting at *Gstatterboden*, and back.

Gstatterbodenbauer

Hiking tour along trail no. 646 or 608, respectively

Hiking tour to the *Gstatterbodenbauer*, starting at *Gstatterboden*, and back.

Nieder- and Hochscheibenalm

Hiking tour along trail no. 646 or 608, respectively (partly)

Hiking tour to the *Nieder- and Hochscheibenalm*, starting at *Gstatterboden*, and back.

Ennsboden trail

Hiking tour along the river *Enns* from the camping ground to the *Kummerbruecke*.

Sonnseitenweg

Hiking tour along the '*Sonnseitenweg*' in *Johnsbach*.

Odelstein cave

Hiking tour and visitation of the *Odelstein* cave, starting at the restaurant *Koelblwirt*.

Ebneralm

Hiking tour along trail no. 669

Hiking tour to the Ebneralm, starting at Ebner (*Johnsbach*). Way back via Koelblalm and along the logging road, passing the gorge. All-day programme includes a hiking tour to the Schroeckalm.

Tamischbachturm

Hiking tour along trail no. 646 or 608, respectively (partly)

Hiking tour to the *Tamischbachturm*, via *Nieder-* and *Hochscheibenalm* and *Ennstaler Huette*, starting at *Gstatterboden*, and back. Overnight stay at the *Ennstaler Huette* is possible.

Zinoedl

Hiking tour along trail no. 601 E4

All-day hiking tour to the *Zinoedl*, via *Hesshuette*, starting at *Johnsbach*, and back. More days: descent via *Sulzkaralm* to the *Hartelsgraben*, or back to *Johnsbach*.

Jodlbaueralm

Hiking tour along trail no. 647

Hiking tour to the *Jodlbaueralm*, starting at *Kirchenlandl*, and back.

Kaderalbl (climbing wall)

Short hiking tour at the *Kaderalbl* (ascent to the climbing wall).

Goferalm

Hiking tour to the *Goferhuette* and back.

Fritz-Proksch trail

Hiking tour along the *Fritz-Proksch* trail, starting at the *Laufferbauerbruecke*, and back.

Kneipp trail

Short hiking tour along the Kneipp trail in *Johnsbach*, starting at the restaurant *Koelbl*, and back.

Bible trail

Short hiking tour along the bible trail, starting at the restaurant *Donner (Johnsbach)*, and back.

Camping ground (Mardersteingraben)

Short hiking tour around the camping ground, to the *Mardersteingraben* and back.

Rafting tour at the Enns

Nature experience within a rafting tour along the river *Enns* (length depending on water conditions).

Nighttime hiking tours

Camping ground – *Mardersteingraben*

Rauchboden trail
Koelblalm

16.5 Numbers of participants within the National Park programme

Event/participants	2004	2005	2006
STUDENTS IN THE NATIONAL PARK			
Students in total	3,245	4,952	7,520
School classes in total	172	214	130
No. of guided tours		171	246
NP comes into schools			
presentations	46		
No. of schools	22		
Excursions			
No. of excursions	114	149	150
Participants	3,366	1,863	2,359
Participants at holiday camps	54	222	148
INFORMATION CENTRES - EXHIBITIONS			
Visitors in information centres	250	11,784	13,250
Visitors at exhibitions	1,147	3,576	5,696
Guided tours through exhibitions	-	15	25
Events			
Presentations, information events	39	56	87
Participants	1,570	1,215	4,139
Events of the National Park Gesaeuse Ltd.	10	85	102
Participants	1,500	5,722	7,300
Events (NPG Ltd. as partner)	20	30	35
Participants in total	7,887	24,396	32,905

16.6 Numbers of participants within the school programme

Event	2005	2006	2007 (12/07)
Alpine pasture excursion			43
Hiking tour alpine pasture	164	260	109
Alpine ecology project		96	95
Botany			13
Excursion		34	21
Academic excursion	58	34	304
Geology exhibition	20	569	328
Geological hiking tour	25	81	53
Odelstein cave	145	181	250
Hiking tour alp huts	20	89	88
Adaption to cold environment	16		
Ecology alpine river	181	61	140
Multivision		1205	1318
Museum			80
Nighttime hiking tour	276	583	428
National Park presentation	1139	558	150
Rafting tour	262	471	255
Nature experience tour	717	316	383
National Park in school		99	162
Orientation		29	305
Mystery rallye		69	45
Observation of red deer	58	57	37
Snowshoeing	25	13	
Climbing	135	490	246
Day of biodiversity	191	124	25
Virtual overflight		25	43
Waldläufer-Camp	26	94	406
Willow dome	1397	1613	1131
Willow dome on tour	28		
Other		66	
Total	4855	7217	6458

16.7 12 rules for commercial rafting

- ◆ Help us to preserve and ameliorate the habitat conditions for animals and plants along the river!
- ◆ The preservation of these last natural river sections should be of common interest!
- ◆ Avoid rafting in shallow water and the approach to sand and gravel banks (areas for spawning, feeding habitats and breeding area for birds, etc.)
- ◆ Keep as much distance as possible to the river banks
- ◆ Commercial rafting is only allowed from 1st May to 15th October, 9.30 a. m. to 5.30 p. m.
- ◆ The commercial rafts have to be made distinguishable by applying numbers. A list of the boats has to be transferred to the National Park's administration.
- ◆ The use of marked exit and entry sites (railway bridge, *Bruckgraben*, *Johnsbachsteg*, bridge *Gstatterboden*, *Weissenbachl*) is obligatory.
- ◆ Bruckgraben: use of the trail through the spruce forest only
- ◆ Recreation at the river is only allowed at the visitor areas. Access to the river at any other place is prohibited.
- ◆ Be quiet! Don't make noise with the paddle.
- ◆ Remove your garbage by yourself!
- ◆ Up-date your knowledge each year by attending the trainings of the National Park Gesaeuse Ltd.! Inform your colleagues and private rafters on the rules and regulations!

16.8 Risk analysis of Natura 2000 habitats and species

	E	Relevance of touristy use															Sensitivity															Intensity of use														
	E	Hiking	Climbing	Mountainbiking	Rafting, kayaking, etc.	Canyoning	Recreation at the river	Angling	Mushrooming	Camping	Entering caves	Aviation	Ski mountaineering	Snowshoeing	Tobogganing	Hiking	Climbing	Mountainbiking	Rafting, kayaking, etc.	Canyoning	Recreation at the river	Angling	Mushrooming	Camping	Entering caves	Aviation	Ski mountaineering	Snowshoeing	Tobogganing	Hiking	Climbing	Mountainbiking	Rafting, kayaking, etc.	Canyoning	Recreation at the river	Angling	Mushrooming	Camping	Entering caves	Aviation	Ski mountaineering	Snowshoeing	Tobogganing			
Habitats of Annex I (Habitats' Directive)																																														
3220 Alpine rivers and the herbaceous vegetation along their banks	B	1			3	1	3	2		1						1			3	1	3	2		1							2			3	1	2	1			1						
4060 Alpine and Boreal heaths	A	0	0													0	0														2	1														
6170 Alpine and subalpine calcareous grasslands	A	0	0													0	0														2	1														
6230 * Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	B	0																												0																
6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	A	0														0															0															
6520 Mountain hay meadows	B	0														0															0															
7230 Alkaline fens	C	0														0															0															
8120 Calcareous and calcshtist screes of the montane to alpine levels (Thlaspietea rotundifolii)	A	0	0													0	0														1	1														
8210 Calcareous rocky slopes with chasmophytic vegetation	A	0	0													0	0														1	2														
8240 * Limestone pavements	A	0	0																																											
8310 Caves not open to the public	A										1																0													1						
Species of Annex II (Habitats' Directive)																																														
1087 Long-horned beetle Rosalia alpina	B	0																																												
1098 Ukrainian brook lamprey Eudontomyzon mariae	B				2	1	1	1											2	1	1	1												3	1	2	1									
1131 Varione Leuciscus souffia	C				2	1	1	1											3	2	2	2												3	1	2	1									
1163 European Bullhead Cottus gobio	B				2	1	1	1											2	1	1	1												3	1	2	1									
1193 Yellow-bellied toad Bombina variegata	C	0			0	0	0	0								0			0	0	0	0																								
1303 Lesser horseshoe bat Rhinolophus hipposideros	C	0																																												
1308 Western barbastelle Barbastella barbastellus	-	0																																												
1324 Greater mouse-eared bat Myotis myotis	-	0																																												
1354 Brown bear Ursus arctos	B	0																																												
1355 Otter Lutra lutra	C				3	1	2	2											3	2	3	3												3	1	2	1									
1902 Lady's slipper Cypripedium calceolus	B	2														2															2															
Birds of Annex I (Birds' Directive)																																														
A091 Golden eagle Aquila chrysaetos	B	2	1									3	2			2	1										3	2			2	1									2	2				
A103 Peregrine Falcon Falco peregrinus	B	0	0									2				0	0										2				1	0								1	0					
A104 Hazel grouse Bonasa bonasia	B	2	0	1					1				2	1	1	2	0	1					1					2	1	1	2	0	1					1				3/1	2	2		
A108 Capercaillie Tetrao urogallus	B	3	0	1					1				3	2	0	3	0	1					1					3	2	0	2	0	1					1				3/1	2	1		
A215 Eagle owl Bubo bubo	B		0									2					0										2				0	0								1						
A217 Pygmy owl Glaucidium passerinum	B	0							0							0							0								0							1								
A223 Tengmalm's owl Aegolius funereus	B	0							0							0							0								1						1									
A234 Grey-headed woodpecker Picus canus	C	1	0						0							2							2								1	0						0								
A408 Ptarmigan Lagopus mutus	B	3	0									2	3	0		3	0										2	3	0	2	1									1	3	0	0			
A409 Black grouse Tetrao tetrix	B	3	0									2	3	1		3	0										2	3	1	2	0								1	3	1	0				
Additional habitats and species																																														
Speikboeden	?	2														2															2															
Grayling	'B'				2	1	1	1											2	1	1	1												3	1	2	1									
Common sandpiper	'C'				3	1	3	2											3	2	3	3												3	1	2	1									
Marmot	'A'	2	2									?				1	1														3/1															
Deer species	'A'	2	1	2	1				1			1	1	1	1	1	0	1	0				0				0	0	0	0	2	1	1													

	Efficiency of management action													Intensity of spoiling													Risk of spoiling																			
	Hiking	Climbing	Mountainbiking	Rafting, kayaking, etc.	Canyoning	Recreation at the river	Angling	Mushrooming	Camping	Entering caves	Aviation	Ski mountaineering	Snowshoeing	Tobogganing	Hiking	Climbing	Mountainbiking	Rafting, kayaking, etc.	Canyoning	Recreation at the river	Angling	Mushrooming	Camping	Entering caves	Aviation	Ski mountaineering	Snowshoeing	Tobogganing	Hiking	Climbing	Mountainbiking	Rafting, kayaking, etc.	Canyoning	Recreation at the river	Angling	Mushrooming	Camping	Entering caves	Aviation	Ski mountaineering	Snowshoeing	Tobogganing				
Habitats of Annex I (Habitats' Directive)																																														
3220 Alpine rivers and the herbaceous vegetation along their banks	2			2	3	2	3		2						2			3	2	2	2		1						1			3	1	3	2		0									
4060 Alpine and Boreal heaths	2	3																																												
6170 Alpine and subalpine calcareous grasslands	2	3																																												
6230 * Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	2																																													
6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	2																																													
6520 Mountain hay meadows	2																																													
7230 Alkaline fens	2																																													
8120 Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)	2	3																																												
8210 Calcareous rocky slopes with chasmophytic vegetation	2	3																																												
8240 * Limestone pavements																																														
8310 Caves not open to the public										3															2																		0			
Species of Annex II (Habitats' Directive)																																														
1087 Long-horned beetle Rosalia alpina																																														
1098 Ukrainian brook lamprey Eudontomyzon mariae				2	3	2	3											3	2	2	2												3	1	1	1										
1131 Varione Leuciscus souffia				2	3	2	3											3	2	2	2												3	2	2	2										
1163 European Bullhead Cottus gobio				2	3	2	3											3	2	2	2												3	1	1	1										
1193 Yellow-bellied toad Bombina variegata																																														
1303 Lesser horseshoe bat Rhinolophus hipposideros																																														
1308 Western barbastelle Barbastella barbastellus																																														
1324 Greater mouse-eared bat Myotis myotis																																														
1354 Brown bear Ursus arctos																																														
1355 Otter Lutra lutra				2	3	2	3											3	2	2	2												3	2	3	3										
1902 Lady's slipper Cypripedium calceolus	2														2															2																
Birds of Annex I (Birds' Directive)																																														
A091 Golden eagle Aquila chrysaetos	2	3									3	2			2	2										3	2		2	1											3	2				
A103 Peregrine Falcon Falco peregrinus	2	3									3	2			1	0										2				0	0										2					
A104 Hazel grouse Bonasa bonasia	2	3	2					3				2	3	1	2		1					2					3/1	3	1	2			0					1					3/1	2	0	
A108 Capercaillie Tetrao urogallus	2	3	2					3				2	3	1	2		1					2					3/1	3	0	3		0					1					3/2	3	0		
A215 Eagle owl Bubo bubo		3									3					0										2					0								2							
A217 Pygmy owl Glaucidium passerinum	2							3							1							2								0							0									
A223 Tengmalm's owl Aegolius funereus	2							3							1							2								0							0									
A234 Grey-headed woodpecker Picus canus	2														1															1																
A408 Ptarmigan Lagopus mutus	2	3									3	2			2	2											2	3		3	0									2	3	0				
A409 Black grouse Tetrao tetrix	2	3									3	2	3		2	0											2	3	2	3	0									2	3	1				
Additional habitats and species																																														
Speikboeden	2														2															2																
Grayling				2	3	2	3											3	2	2	2												3	1	1	1										
Common sandpiper				2	3	2	3											3	2	2	2												3	2	3	3										
Marmot	2/3														3/2															2/1																
Deer species	2	3	2												2	2	1													1	0	0														

