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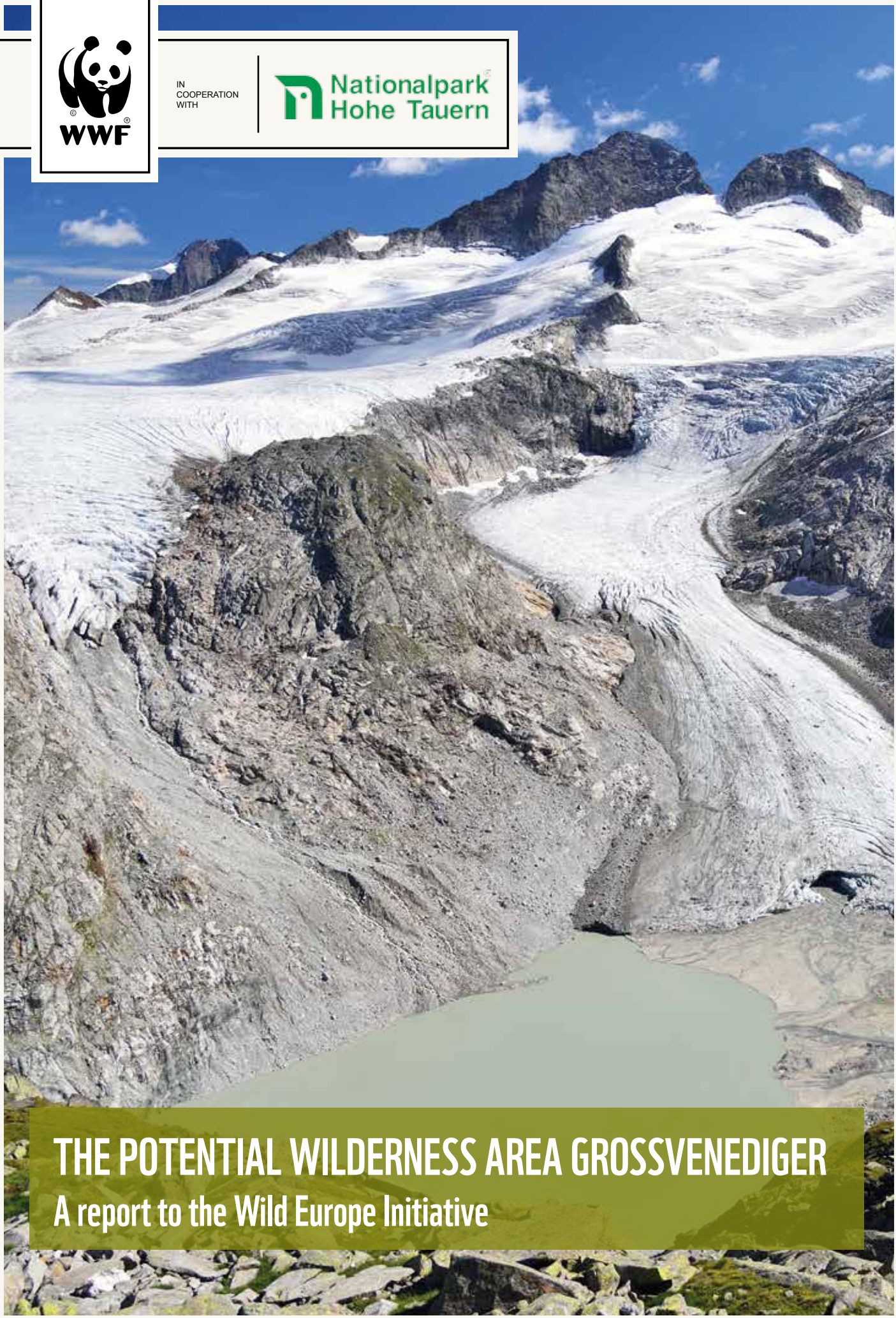

THE POTENTIAL WILDERNESS AREA GROSSVENEDIGER

A report to the Wild Europe Initiative

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written by:

- Bernhard Kohler, Head of Austrian programme, WWF Austria, Ottakringerstr. 114-16, 1160 Vienna, Austria, *bernhard.kohler@wwf.at*
- Michael Zika, Wilderness officer, WWF Austria, Ottakringerstr. 114-16, 1160 Wien, Vienna, Austria, *michael.zika@wwf.at*
- Vlado Vancura, Director Wilderness Development, European Wilderness Society, Dechant Franz Fuchs Str., 5580 Tamsweg, Austria, *vlado.vancura@wilderness-society.org*

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I. EXECUTIVE SUMMARY

The present report was produced by WWF Austria, with the support of the European Wilderness Society. It assesses the compliance of a proposed wilderness area in Hohe Tauern national park with European wilderness criteria and definitions as they were published in 2012, by the Wild Europe Initiative. The planned establishment of a wilderness area within national park Hohe Tauern Salzburg responds to the new Austrian National Park Strategy 2010, which calls on Austrian national park to strengthen the wilderness character of their core areas.

Hohe Tauern national Park (185,600 hectares) is the largest national park in the Alps. It is an area of high mountains, covering an altitudinal range between 1,010 and 3,798 m a.s.l. Within the park, 266 peaks exceed a height of 3,000 m a.s.l. and glaciers cover a total area of 13,000 hectares. Water is a very prominent feature of the landscape, with 279 recorded rivers and brooks, 26 major waterfalls, 551 mountain lakes and 650 bogs. Habitat types of the subalpine, alpine and nival zones are well represented in the park, as most of the area is located above the tree line, while forests account for only 20,100 hectares, or just 11% of the park. Biodiversity is remarkably high: Hohe Tauern National park harbours 44% of Austria´s plant species, 47% of its mammals and birds, a third of the butterfly-, a quarter of the beetle- and almost 69% of the bumblebee-species in the country. Organisms adapted to the harsh conditions of high altitude environments feature prominently among most systematic groups. Species with an arctic-alpine distribution are found alongside taxa typical for European and Asian mountain ranges, while the southern slopes of Hohe Tauern even harbour species of dry Mediterranean mountains. There is a relatively high proportion of endemics among plants and inverterbrates, the Hohe Tauern range being one of the six major centres for endemism in Austria. Geology is extremely varied and parts of the range are famous for their rich mineral occurrences, 200 different types of minerals have been found there.

Hohe Tauern national park is located in the boundary region of three Austrian federal provinces (Salzburg, Carinthia, Tyrol). As nature conservation in Austria is in the responsibility of provincial governments, the park consists of three contiguous, but autonomous units, each with their own administration, budget, infrastructure, legal framework and management, but with a joint corporate identity and some joint research and management activities, especially with regard to wide-ranging species of wildlife. The Salzburg part of Hohe Tauern national park is the largest (80.500 hectares), followed by the Tyrolean (61.100 hectares) and Carinthian (44.000 hectares) parts. All three parts share a common zonation system, distinguishing between core zones and external zones. In Carinthia and Salzburg there is an additional category, the so-called special protection areas. Core zones make up for a total area of 114,500 hectares in the entire national park (Salzburg: 50,700, Tyrol: 34,700, Carinthia 29,100 hectares). These core zones provide for a high level of nature protection, although only parts of them fully conform to IUCN-criteria for national park core zones, by excluding any extractive form of land-use. In the Salzburg part of the park 78,9% (40,000 hectares)

of the declared core zone area comply to IUCN-criteria. The remaining core zone areas still have some low-intensity forms of land-use, like hunting and grazing. Special protection areas cover a total of 3,200 hectares in Salzburg and 3,600 hectares in Carinthia. These areas have the highest protection status, excluding not only extractive land-use, but any human intervention into nature. In fact, the existing regulations for special protection areas come very close to those which would be expected for wilderness areas. The third category is made up by the so called "external zones", which cover a total of 64,300 hectares, or 34.6% of the park area (Salzburg: 26,600, Tyrol: 26,400, Carinthia: 11,300 hectares). Despite their somewhat confusing name, these zones form an important and integral part of the protected area. Their main focus is on preserving ancient cultural landscapes and their associated biodiversity. In external zones, traditional forms of land-use like pasturing, hay-making, low-intensity forestry, etc. are encouraged, the low-intensity character of these activities being secured through targeted subsidies. Regardless of the zonation, all national park areas in all three provinces have been declared Natura 2000-sites, both under the EU-Birds- and Habitat directives.

An analysis of the national park laws and regulations clearly demonstrates the added value of setting up a wilderness area within the boundaries of the park. Those core zones of the national park that presently conform to the rules of an IUCN category II-area certainly provide for a high degree of nature protection by excluding extractive forms of land-use, but they do not secure a full non-intervention management regime, as the core zones of a wilderness area would. Upgrading suitable areas within the existing core zones will therefore help to reinforce and to secure the wilderness character of the most natural and least modified parts of the Hohe Tauern landscape.

The proposed wilderness area covers an area of 9,761 hectares along the main ridge of the Hohe Tauern range and in the valley heads of Krimmler Achental, Obersulzbachtal, Untersulzbachtal and a small portion of Habachtal. It is centered around the highest peak of the western Hohe Tauern range, Grossvenediger (3,660 m) and harbours another 29 named and 42 unnamed elevations with a height in excess of 3,000 m. There are more than 16 glaciers in the area, among them Obersulzbachkees, the third largest glacier in Austria. Four major wild rivers originate from the area. As most of the land is located in the subalpine, alpine and nival altitudinal belt, the landscape is dominated by vast expanses of rocks, boulders and scree (40% of the area), glaciers and snowfields (32%) and sparsely vegetated ground (20%). Alpine grassland makes up for 5.3% and subalpine conifer forest for 1.3% of the area. The climate is very harsh, annual average temperatures amount to only 1.4°C, with extremes ranging between -28.7 and +24.4 °C. Annual average precipitation is 1,496.4 mm, snow cover lasts for 225.6 days/year, maximum snow depths reach 330 cm. Strong winds further add to the harshness of the climate, especially in winter.

According to a recent modelling effort of Austria´s wilderness potential, the proposed area is located within the second largest contiguous block of wilderness in Austria (wilderness in the sense of Lesslie´s wilderness continuum concept, "wilderness quality" being assessed on the basis of remoteness from permanent settlements, remoteness from access, absence of permanent civilisation facilities and the degree of biophysical naturalness).

Land ownership within the proposed wilderness area is shared by the Austrian Federal Forests (ÖBf, 6.793 hectares, 71.4% of the area) and a private conservation association, "Verein Natursschutzpark"(VNP, 2,799 hectares, 28.6% of the area). Both landowners have leased their land use rights (mostly referring to hunting and grazing) to the national park on the basis of contractual arrangements and annual payments, which secure the discontinuation of all extractive uses. Grazing rights persist on 502 hectares of Federal Forest Land. In the process of establishing the wilderness area, the national park plans to make legal arrangements for the transfer of these grazing rights to adjacent land. With respect to the zonation system of the park, a little more than a quarter of the proposed wilderness area (2,654 hectares) has the status of a special protection area, the rest is mostly core zone.

COMPLIANCE WITH WILD EUROPE CRITERIA, REGARDING

- ***Size and zonation:*** *As the proposed wilderness area has a size of 9,731 hectares (of which 9,228 ha are to be wilderness core zone from the outset), the minimum size criterion (10,000 ha) of Wild Europe is almost met. According to the European Wilderness Quality Standard and Audit system, the area would thus qualify for the "Gold Standard". Since the wilderness core is larger than 8,000 hectares, a large buffer zone is not necessary. As long as the issue of grazing rights is not settled however, the above mentioned 502 hectares should be declared as wilderness buffer zone, to become part of the core eventually. Declaration of a transition zone is highly recommended by Wild Europe for all wilderness areas. In the Hohe Tauern case, the wilderness core is either surrounded by national park core zones or by national park external zones (with a depth varying from several hundred meters to several kilometres). As these areas easily fulfil the management criteria for a transition zone, it is not necessary to delimit such a zone for the planned wilderness area separately.*

- ***Biodiversity:*** *Biodiversity features dependent on human management interventions (like grazing, mowing etc.) do not figure prominently among the values of the proposed wilderness area. Discontinuation of active management will thus not affect the biodiversity of the area. Rather, the establishment of a wilderness area will support those components of biodiversity, which depend on strict non-intervention management and on unrestrained natural processes. The wilderness area seems to be large and varied enough to reduce the likelihood of chance extinctions in local animal or plant populations. Even if such extinctions would occur, connectivity to surrounding, very similar habitats is excellent and natural re-colonisation is probably a realistic option.*

- ***Natural processes:*** *Unrestrained action of extremely violent, landscape-shaping processes is a very obvious feature of the proposed wilderness area. Avalanches, rock falls, land-slides, floods, storms, extreme temperatures and the periodic recession/advance of glaciers are continuously shaping and modifying the area. Due to their nature and intensity, none of these processes is actually controllable by man. However, considerable past human impact on the area has resulted from former grazing activities with domestic herbivores and from the eradication of large mammalian predators, of most avian scavengers and of parts of the wild ungulate species spectrum. This has led to the disruption of*

important biotic interactions and to changes in the vegetation dynamics of the area. The discontinuation of domestic grazing and the successful recovery of both wild ungulate- and avian scavenger-populations will lead to a partial restoration of former interactions and processes. Currently, the only major deficit is the absence of Wolf, Brown Bear and Lynx from the area. In the light of recent range expansions of the Wolf in the Eastern Alps and ongoing re-introduction projects for Brown Bear and Lynx, there is some hope for a return of these species in the medium or long term. Regarding natural dynamics, mention must also be made of two processes induced by climate change: the current recession of glaciers and the advance of the tree line to higher altitudes. The former uncovers vast areas of truly virgin land within the proposed wilderness area, while the latter compensates to a certain degree for former human interventions into high-altitude forests. Although ultimately triggered by anthropogenic influences, both processes offer unique opportunities to observe natural vegetation dynamics in an otherwise undisturbed setting.

- ***Settlements:*** *There are no settlements or buildings within the proposed boundaries of the wilderness area. The visual impact of two alpine huts (Kürsinger and Warnsdorfer Hütte), which are located just outside the area, can be considered as rather low and localised. The huts are an important part of the touristic infrastructure of the national park. As there is no road access to the huts, supply activities have to rely either on helicopter transport, or on cable cars. To minimize acoustic disturbance, the national park is keen to keep helicopter flights to an absolute minimum (2 spells of supply flights per year) and thus strongly favours cable car transport. The cable cars supplying the huts are located outside the wilderness area, but have a certain, although very limited visual impact on the landscape. The same holds for the small power line supplying Kürsinger Hütte with electricity. Nevertheless, opportunities to reduce the visual impact of both buildings and their supply infrastructure should be used, whenever they arise.*

- ***Infrastructure, tracks and trails:*** *There is no built infrastructure within the proposed wilderness areas. The trail network is not dense and trail markings are largely unobtrusive. A very limited number of sign posts have been set up at critical points of the trail network. Most of the area is devoid even of simple tracks. All existing trails are narrow hiking paths, just broad enough for a single person. Trails have to be constantly cared for, as snow-melt, rains, rock-fall and avalanches almost annually destroy trail sections. Only a few years of neglect would render most trails impracticable. Trail maintenance is mostly done with simple instruments, by skilled volunteers from Alpine Clubs, which have developed a philosophy of minimum intervention-trails and run extensive programmes for restoring multiple track-trails to single low-impact routes. As it makes sense to concentrate visitor impact on single tracks along major hiking routes, the present level of trail maintenance and marking should be sustained, but no new trails should be opened within the wilderness area. An exception to this rule will have to be made for security reasons: in recent years, geomorphological dynamics in the area have strongly increased due to climate change (thaw of permafrost soils resulting in an increased frequency of large scale landslides and rock-falls). Some traditional trails have been destroyed altogether or have become too dangerous for further use. In such cases, the establishment of new and safer routes must be permissible, to secure basic access to the area. Currently, there is no technical infrastructure in place to secure human life and property*

against avalanches, landslides and rock-fall. The regulations for the future wilderness area should clearly state that no technical modifications of the landscape are permissible within the area, not even for protective reasons. Any protective installations outside the wilderness boundaries should only be allowed with special consideration for visual impacts on wilderness values. In this context, it will be essential to carefully plan and consider activities downhill of the wilderness area (location of new agricultural buildings, access roads), so that no new needs for protective measures arise from such developments.

- ***Access:*** *The national park law clearly states that "the conventional forms of alpinism and hiking, ski touring etc." are not subject to restrictions within the park, with the exception of special protection areas, where stricter regulations might be in place. There is no general obligation to stay on marked paths or trails. Thus, the Wild Europe requirement of free access to wilderness areas is basically met. However, the parks administration should keep up legal options for temporally restricting access to parts of the future wilderness area. This is of special importance in winter, when availability of undisturbed habitat is essential for the health and survival of deer, chamois, ibex and grouse. Provision of quiet zones is a proven alternative to the widespread, artificial winter feeding of wild ungulates and a key factor in "keeping wild animals wild". Having vital ungulate and grouse populations, which can exhibit their natural behaviour and rely on their special wintering adaptions must have absolute priority over human visitor interests in the wilderness area. Nest protection zones around raptor´s eyries will be another good reason for restricting access to parts of the area. As there are no driveable roads in the proposed wilderness, the "no wheels" and "no motorized access"-criterion is easily met. Traffic on the small dirt roads which end at some distance from the wilderness area is very limited and restricted by the existing national park regulations. There are no suitable roads or trails for mountain bikes within the area. Access with horses is impossible due to the difficult terrain. National park rules prescribe that dogs have to be kept on leads anyway, so this criterion is also met. The use of low-flying aircraft for recreational purposes is generally forbidden in the national-park. Rescue flights in emergency situations and a limited number of helicopter flights for supplying huts and transporting heavy gear needed for trail maintenance are permissible, however. These regulations will have to be kept up after establishment of the wilderness area, although the number of supply flights should be reduced as far as possible.*

- ***Collecting berries, mushrooms and nuts:*** *This is not an issue within the proposed area.*

- ***Livestock grazing:*** *Grazing of domestic livestock has already been discontinued over most of the future wilderness area. The remaining grazing rights on 502 hectares will be transferred to adjacent land.*

- ***Forestry:*** *As there is hardly any forest within the proposed wilderness area and as all land-use has already been discontinued after compensation of the land-owners, extractive forestry is not an issue. Still, the Austrian forestry law also applies to unused forests, prescribing interventions in the case of bark-beetle outbreaks, large scale break-down of forest cover, apparent lack of rejuvenation and for the maintenance of protective forests.*

Exemptions from these obligations are only possible in forests declared as "biotope-protection forests" under § 32a of the Austrian forestry law. The national park should apply for such a status with respect to the wilderness area, even if at the moment, there is not much forested land within it. Forests might advance into the area in the future, due to climate change, as a consequence from the release of grazing pressure by livestock and as a result of the still on-going recovery of forests from historical overuse. With increasing forest cover, the likelihood of natural disturbances affecting the stands will increase as well. Since the above mentioned forestry measures are not at all compatible with a wilderness area, it would seem wise to secure the legal basis for a total non-intervention management regime right from the outset.

- ***Dead wood collection:*** *This is not an issue within the proposed area.*

- ***Hunting, fishing and game management:*** *Game management in Hohe Tauern national park largely conforms to the guiding principles for ungulate management, as developed in 2011 by Nationalparks Austria, the joint roof organisation of all Austrian national parks. In the Salzburg part of the park, game management is further embedded in a regional concept for wildlife management (WÖRP), which reaches far beyond the boundaries of the protected area. Current game management practices within the park would fulfil most requirements for a wilderness area as well, and should be upheld after its establishment. However, a stricter approach should be taken with respect to exemptions for management interventions: they should not be allowed in the wilderness core zone, not even in the case of epizootics and diseases. Stronger emphasis should also be placed on the restoration of natural phenomena, like the migration of red deer between high-altitude summer ranges and wintering grounds in distant valley floors. A scientifically sound road map for the restoration of both migration routes and wintering grounds should be developed, including a plan for the gradual phasing out of the remaining winter feeding stations (all currently located outside the national park core zones). Fishing is not an issue within in the proposed wilderness area, as the relevant river sections harbour no harvestable fish populations, due to high flow velocity, low temperature, high degrees of turbidity and the occurrence of natural barriers, like waterfalls. Still, the management practices in river sections below the proposed wilderness area should be modified so as to meet both national park and wilderness goals (no artificial stocking, no use of non-native species, strong reliance on natural reproduction of native fish stocks).*

- ***Crop agriculture:*** *This is not an issue in the proposed area.*

- ***Research and monitoring:*** *The numerous and varied research activities of the national park focus on key-species and habitats, on landscape level-processes and on relevant management issues. Most of this work would be highly relevant to the proposed wilderness area as well. The national park should thus keep up the present level of monitoring and research, complementing it with projects that will provide guidance on special wilderness restoration and management issues. Many research activities in the park observe minimum intervention principles already by now. Within the proposed wilderness area, minimizing both visible and ecological impacts of research and monitoring will be of special importance.*

- ***Restoration and rewilding:*** *The national park has seen three very successful wildlife restoration projects: The re-introduction of the ibex (launched by hunters even before the establishment of the park), the ongoing re-introduction of bearded vultures and the recently started re-introduction of the Danube strain of brown trout to selected rivers in the national park. Future restoration attempts could focus on the already mentioned restoration of deer migration routes and wintering grounds and on measures supporting the autonomous return of Wolf, Brown Bear and Lynx. Such measures would focus on the external zones and the surroundings of the national park. They would include awareness raising programmes, the establishment of livestock protection programmes and the adaption of ungulate management and hunting practices to the presence of large carnivores.*

- ***Tourism and recreation:*** *Due to the difficult terrain, access to the proposed wilderness area is limited to simple, muscle powered forms of travel, like hiking, climbing and skiing. Canoeing is not possible because of the steepness and ruggedness of the relevant river sections, mountain biking is precluded by the lack of driveable tracks and paragliding is forbidden by the regulations of the national park, which do not allow for any aerial traffic for sportive purposes. Thus, Wild Europe criteria regarding recreational use are well met. Setting up tents is not allowed in the national park, but climbers may sleep under the open sky when they are either forced to do so by special circumstances, or when they undertake a demanding tour, which cannot be completed within a single day. These regulations should be maintained for the wilderness area. Given the relatively small size of the area and the availability of huts near its border, there is no need to set up special camping grounds or to allow deliberate camping within the area. Visitors to the wilderness area should be actively informed and educated about "leave no trace rules". A more specific set of leave no trace rules should be developed for climbers and hikers on skis. Alpine guides and national park wardens should be trained for the propagation of these rules.*

- ***Landscape management:*** *As the proposed wilderness area is embedded in the core zone of the national park, Wild Europe requirements concerning full perception of wilderness atmosphere are largely met. However, the national park administration should take great care that no visible human infrastructure is installed in the vicinity of the wilderness area – this includes all slopes and ridges visible from within the area, even if they are located at some distance and even if national park rules would not preclude installations in these places. Keeping an optical buffer area free of major landscape changes will be of great importance for the maintenance of an undisturbed wilderness impression. Acoustic intrusion is currently minimal, motorized machinery is normally not to be heard in the area. Due to the remoteness from large airports, aircraft overflying the wilderness area travel at very high altitudes; condensation trails are a regular sight, but acoustic impact is low. Noise from low-flying aircraft (helicopters) is limited to occasional rescue flights and the restricted number of supply flight to huts in the vicinity of the area.*

- ***Fire control:*** *Fire is currently not a relevant ecological factor in the area, because of the high amount of precipitation, the lack of forests and the low amount of available fuel in alpine plant communities. No special regulations for fire management are therefore needed at the moment (the situation may change with climate change and the advance of forests into the area).*

- ***Disease control and bark beetle management:*** *Since the proposed wilderness is located at high altitudes and lacks major tracts of forested land, bark beetle outbreaks are currently not an issue within the area. As with fire, this may change in the future, due to climate warming. At the moment, no management prescriptions regarding bark beetles are needed. As for wildlife diseases, possible outbreaks of sarcoptic mange (affecting chamois, ibexes and domestic sheep) will constitute a recurring challenge for the management of the wilderness area. Veterinary laws currently prescribe radical interventions into affected ungulate populations, by culling all individuals showing signs of the disease. This would not be compatible with the strict non-intervention approach in wilderness core zones. Some wildlife veterinarians argue that radical culling measures will not prevent the spread of the disease anyway, but rather tend to promote it through individuals fleeing from the culling attempt. As an alternative, they suggest setting up large scale quiet zones, where hunting is totally banned for the duration of the epizootic and where access for visitors is drastically restricted as well. Affected ungulate herds are not molested within those zones, to keep large scale movements to a minimum. Only individuals leaving the area are shot. This model could be applied to the wilderness area, the wilderness core acting as a permanent quiet zone. But such an arrangement would need the consent of neighbouring hunters, which could eventually be reached within the framework of the regional wildlife management concept. Since the economic risks associated with an uncontrolled spread of the disease are high, it remains to be seen whether such arrangements are achievable.*

- ***Alien species control:*** *Invasive alien species are not a major issue in high altitude regions of Austria, at least not for the moment. Most aliens concentrate in the lowlands, the harsh mountain environments being obviously resistant to invasions by generalist organisms. However, in the vicinity of the proposed wilderness area, non-native species are an issue with regard to fisheries, which rely heavily on artificial stocks of rainbow and brook trout, two species of North American origin. A change in the fisheries management (as proposed above) could help to solve this problem.*

1. INTRODUCTION

Within Europe, the Alps are one of the most promising regions for both wilderness preservation and wilderness restoration (Fisher et al. 2010). Austria has a major share in the Alpine arc (54,600 km2, corresponding to 29% of the total mountain range) and thus a high degree of responsibility for wilderness protection in that major European ecoregion. Still, nature conservation in the Austrian Alps is very much focused on cultural landscapes. There is a single, relatively small wilderness area, conforming to IUCN 1b-criteria (Wildnisgebiet Dürrenstein, 3.5 km2) representing just 0.04% of the national territory. Additionally, there are six Austrian national parks, three of which are located in the Alps (NPs Hohe Tauern, Kalkalpen and Gesäuse). The core zones of Austrian national parks (totalling 1,598 km2, or 1.9% of the national territory) are essentially non-intervention areas, which might qualify as wilderness on principle. Yet, not all Austrian national parks have fully embraced the non-intervention philosophy in their core zone-management. There is still a wide array of management approaches, ranging from almost full compliance to the wilderness concept, as practised in NP Kalkalpen, to a more traditional approach as in NP Gesäuse, where bark beetle management followed conventional forestry views until the year 2012. In other parks, true non-intervention management is only practised on parts of the declared core zones. Outside national parks, wilderness was not even perceived as a conservation option until very recently.

This situation has prompted WWF Austria in 2010 to set up a wilderness programme and to join forces with the Wild Europe Initiative. The long-term goal of WWF Austria is to bring to bear the full alpine wilderness potential and to have wilderness areas established on at least 5% of the national territory. To achieve this ambitious goal, it will need a twofold strategy: to set up new wilderness areas on hitherto unprotected land and to improve the quality and status of already existing non-intervention areas. International back-up will be a crucial element in both approaches. From the outset, activities of the Wild Europe Initiative have provided essential support to wilderness work in Austria. With regard to national parks, the outcomes of the Wilderness Conference in Prague 2009 have substantially influenced the development of the new Austrian National park strategy. Under the impression of the “Message (poselstvi) from Prague”, the Austrian Ministry of Environment has placed the idea of wilderness at the heart of the new strategy (endorsed in 2010), declaring that all Austrian national parks shall henceforth focus on ecological process management in their core zones. The establishment of strict non-intervention zones (explicitly referred to as ”wilderness”) has been set as a clear and binding goal for all parks. The strategy also specifies that non-intervention areas shall make up no less than 75% of the national parks area, as required by IUCN criteria (Lebensministerium, 2010).

Although some Austrian parks conform to these requirements by now, the strong emphasis on ecological process management and the explicit mention of wilderness in the new national park strategy have raised many practical questions about core zone management in most parks. This provides an excellent opportunity for the Austrian wilderness movement to promote and develop the wilderness approach, both within and outside national parks. For want of any other declared,

large non-intervention areas, and with the advantage of their highly developed administrative structures, the national parks have become something like the Austrian wilderness laboratories, where wilderness management techniques and regulations are developed and put to a test.

As an example, the highly controversial issue of bark-beetle management in protected areas has been successfully tackled by a commission of Nationalparks Austria, the joint roof organisation of the Austrian national parks, which involves park administrations, provincial and federal government representatives, stakeholders and NGOs. The commission has produced a position paper which sets new standards for bark-beetle management not only in the Austrian national parks, but also in future wilderness areas (Nationalparks Austria 2013). It is essential that the recent wilderness impetus of Austrian national parks receives further support, both from the Austrian and the European wilderness movement.

Against this background, WWF Austria was highly pleased to learn that the administration of the Salzburg part of the Hohe Tauern national park intends to set up a wilderness area on a 10,000 ha portion of their park. The director of the park, Mr. Wolfgang Urban is keen to design this area according to the criteria and definitions for wilderness areas in Europe, as developed and recently published by the Wild Europe Initiative (Wild Europe 2012). He further intends to apply for certification according to the European Wilderness Quality Standard and Audit System (EWQA) of the European Wilderness Society (EWS). Eventually, the national park seeks to gain IUCN 1b recognition for the envisaged wilderness area. As a first step towards these goals, National Park Hohe Tauern has invited a small delegation from the European Wilderness Society and WWF Austria, to discuss the wilderness project in detail and to receive advice on possibly conflicting issues. The visit of the delegation took place from July the 29th to August, the 1th, 2012. Participants were Vlado Vancura, Director for Wilderness Development of the European Wilderness Society (then still PAN-Parks), Michael Zika, wilderness officer of WWF Austria and member of the Wilderness Working Group and Bernhard Kohler, head of the Biodiversity Programme of WWF Austria (Fig. 1). The national park was represented by its director, Mr. Wolfgang Urban and the vice-director and head of wildlife management, Mr. Ferdinand Lainer. Mrs. Barbara Hochwimmer, GIS-officer of the park also took part in some excursions.

The present report is based on that visit and has three sections: the first provides a description of Hohe Tauern National Park, the second describes the proposed wilderness area and its management. In the third section, we discuss the compliance of the Hohe Tauern wilderness project with the criteria and definitions of the Wild Europe Initiative (Wild Europe 2012). A short section on the European Wilderness Society (EWS) and on the European Wilderness Quality Standard and Audit System (EWQA) concludes the report. **It is important to note that at the time of the study visit (August 2012) and the production of the report (Winter 2012/2013), the Wild Europe Initiative´s Working Definitions of European Wilderness and Wild Areas were the most up-to-date reference for evaluating wilderness areas. Since then, the EWS has been gradually developing a more refined standard, that largely builds on the seminal document of Wild Europe. However, when the present report was printed (September 2014) the process of fully harmonising the two standards was still underway. Therefore, throughout the report, we only refer to the Wild Europe criteria.**

Fig.1. The visiting group (from left to right): Bernhard Kohler and Michael Zika (WWF Austria), Vlado Vancura (European Wilderness Society), Wolfgang Urban (NP Director)

2. HOHE TAUERN NATIONAL PARK

2.1 NATURAL FEATURES AND BIODIVERSITY

Hohe Tauern National Park is the largest national park in the Alps and covers an area of 185,600 hectares (Fig. 2). From west to east, the park stretches over a distance of more than 100 km, its width reaching up to 40 km. Hohe Tauern National Park is essentially an area of high mountains, covering an altitudinal range between 1,010 and 3,798 m a.s.l. (the elevation of Austria´s highest peak, the Großglockner). Within the park, 266 peaks exceed a height of 3,000 m a.s.l. and glaciers cover a total area of 13,000 hectares. Water is an essential feature of the landscape, with 279 recorded rivers and brooks, 26 major waterfalls, 551 mountain lakes and 650 bogs (Nationalpark Hohe Tauern 2011). Habitat types of the subalpine, alpine and nival zones are well represented in the park, as most of the area is located above the tree line, while forests composed of Norway Spruce *(Picea abies)*, Larch *(Larix decidua)* and locally Stone Pine *(Pinus cembra)* account for 20,100 hectares, or just 11% of the park. The landscape in the highest portions of the Hohe Tauern national park consists of sparsely vegetated areas with rocks, boulders and scree, extensive snowfields and glaciers, which contrast strongly with the rich flowery alpine meadows, lush communities of tall herbs and dense alder and pine scrub, found in its lower sections.

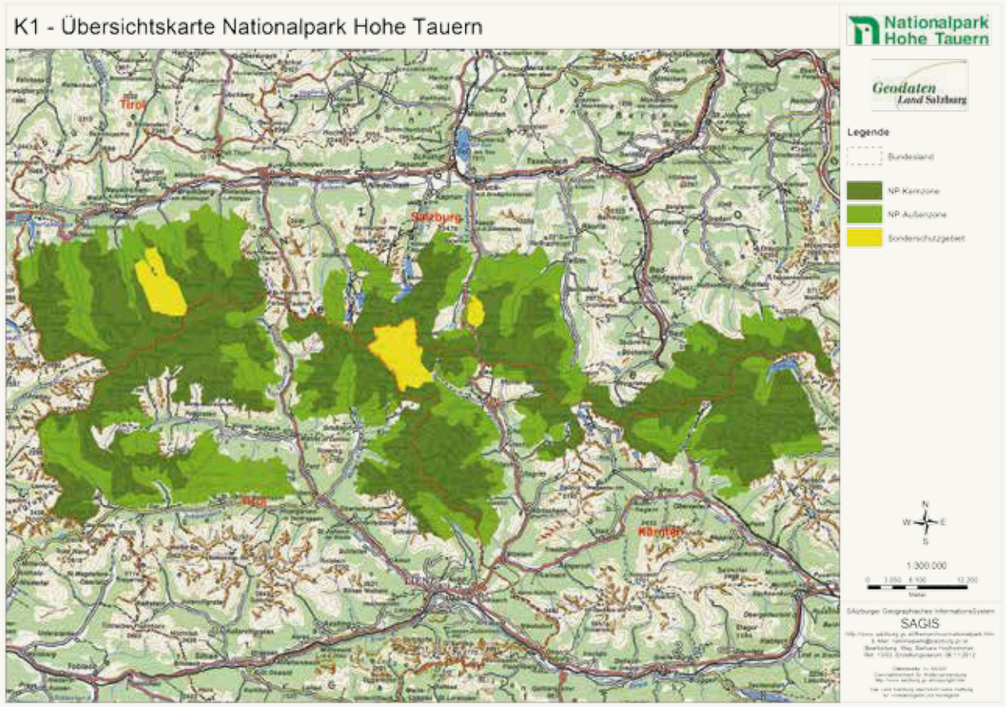

Fig.2. Zonation of Hohe Tauern national park: core zones in dark green, external zones in light green, special protection areas in yellow. Provincial borders of Tyrol, Salzburg and Carinthia shown as dotted red lines.

Biodiversity is remarkably high: Hohe Tauern National park harbours 44% of Austria´s plant species, 47% of its mammals and birds, a third of the butterfly-, a quarter of the beetle- and almost 69% of the bumblebee-species in the country (National Park Hohe Tauern 2011). Organisms adapted to the harsh conditions of high altitude environments feature prominently among most systematic groups. Species with an arctic-alpine distribution like Ptarmigan *(Lagopus mutus)*, Mountain Hare *(Lepus timidus)*, Mountain Burnet *(Zygaena exulans)* and Mountain Aven *(Dryas octopetala)* are found alongside species typical for European and Asian mountain ranges like Ibex *(Capra ibex)*, Chamois *(Rupicapra rupicapra)*, Marmot *(Marmota marmota)*, Snow Vole *(Chionomys nivalis)*, Alpine Chough *(Pyrrhocorax graculus)*, Small Apollo *(Parnassius sacerdos)* and Edelweiss *(Leontopodium alpinum)*. The warm and dry valleys on the southern slopes of Hohe Tauern even offer suitable habitats for species of dry Mediterranean mountains, like Rock Partridge *(Alectoris graeca)*, Alpine Swift *(Apus melba)*, Rock Trush *(Monticola saxatilis)* and Chalk-hill Blue *(Polyommatus coridon)* (Stüber & Winding 2007, Huemer & Wieser 2008). There is a relatively high proportion of endemic species among plants and inverterbrates; in fact, the Hohe Tauern range represents one of the six major centres for endemism in Austria (Rabitsch & Essl 2009). Geology is extremely varied and parts of the Hohe Tauern are famous for their rich mineral occurrences, 200 different types of minerals have been found there.

2.2 HUMAN IMPACT AND LAND-USE

Like most of the Alps, the Hohe Tauern have a long tradition of human land use, reaching at least back into the late Neolithic/Early Bronze Age. Millenia of grazing, subsistence agriculture, domestic wood use and mining activities have profoundly altered the landscape. Human impact has especially affected the distribution, extent and composition of forests, replacing them by pastures and meadows in high and middle altitude sites, and by arable fields on the lower slopes and valley bottoms. In the remaining forest patches, species composition shifted towards pioneer species like Larch or quickly growing Spruces, while the slow growing and much sought-after Stone Pines were exterminated in many valleys. Deforestation reached its maximum in the 19th century and was especially heavy in river catchments allowing long-distance transport of wood to urban centres or metal and salt processing sites. Mountain forests were relieved from reckless exploitation only 200 years ago, with the advent of fossil fuels and the development of modern forestry. In most places, the slow growing high-altitude forests are still recovering from the former overexploitation. At the same time, pasturing and hay-making, which were the dominant land uses above the tree line and on most cleared forest land have lost some of their importance, progressively withdrawing to the more favourable and accessible sites. Arable agriculture on the valley bottoms and lowest slopes was abandoned in the 1960ies at the latest, making room for intensive meadows, settlement and other development.

Today, traditional land use and the corresponding cultural landscape are still very important elements in the national park. The landscape in and around Hohe Tauern national park currently covers a wide spectrum of human land-use patterns: from almost wild, untouched areas in high altitudes and on steep slopes, across the wide mountain pastures and moderately used forests in the middle altitudes, to the more intensively managed meadows of the valley bottoms.

Outside the park, settlements, roads, river regulation, touristic infrastructure and facilities for large scale energy production have strongly modified the alpine landscape during the last decades. The establishment of the park was essential in keeping large tracts of land free from such development. This is especially true for hydropower installations. From the 1930ies to the 1980ies, huge dams were built in the central portion of Hohe Tauern (the Großglockner-range), flooding entire valleys and diverting water from many rivers and streams to fill the large storage basins. The related infrastructure (access roads, power lines, cable cars, tunnels for water diversion etc.) has permanently disfigured many formerly wild areas. In the 1970ies and 1980ies, there were ambitious proposals to expand intensive hydropower use to the entire Hohe Tauern range, which led to severe conflicts between developers and environmentalists. The battle was eventually won by the latter and resulted in the establishment of the national park in its present form.

The creation of the park was also of outstanding importance with regard to another modern type of alpine land use, tourism. From the mid-20th century onwards, touristic development in the central Hohe Tauern region was strongly tending towards mass tourism, with sight-seeing roads, cable-cars, ski-resorts and restaurants encroaching even on very remote valleys and gla-

cier areas (partly facilitated by the previously built hydropower infrastructure). As with hydropower, there were proposals to extend this intensive touristic use to the hitherto undeveloped parts of the mountain range. Through the establishment of the national park, large tracts of untouched land could be preserved. Nature-friendly tourism was systematically strengthened and promoted by the park´s administration. Today, nature based tourism is an essential part of the overall touristic concept of the region.

2.3 LAND OWNERSHIP

Most land in Hohe Tauern national park is privately owned. Land belonging to individual farmers and farmers associations accounts for 62% of the park´s area, while another 21% is in the hands of NGOs (alpine clubs and conservation organisations). Only 16% is public land, with the Austrian Federal Forests as the major landowner. In the Salzburg part, the pattern is somewhat different: while farmers and farmers associations hold 59% of the area, public ownership amounts to 35%; the share of NGOs is only 6%. The ownership structure has important implications for the implementation of non-intervention zones in the park, because all restrictions to existing land use rights and to economic activities have to be negotiated with the landowners and compensated financially. This is even true for public land. When Austrian national parks were established in the 1980ies and 1990ies, there was an arrangement which foresaw compensation payments even to the Austrian Federal Forests, on account of their semi-private character. Therefore, establishing non-intervention areas in Austria generally comes at the price of compensation payments to land-owners. The only alternative would be to limit non-intervention areas to completely unused land (which is hardly available) or to the property of NGOs.

When Hohe Tauern national park was established, farmers and farmers associations proved to be the toughest negotiators, staunchly defending their economic interests. This has set very clear limits to the development and location of non-intervention zones, especially in the Tyrolean part. But in Salzburg too, farmers united in a so called “Schutzgemeinschaft” (“Protection association”), where the word “protection” tellingly refers to the interests of land-owners, and not to the protection of nature. However, after long and hard negotiations, contractual arrangements (referring mostly to the lease of hunting and grazing rights) were reached on substantial portions of the park, which eventually paved the way for IUCN recognition of three parts of Hohe Tauern National Park (see section 2.4). Still, land ownership patterns differ markedly between core and external zones. In Salzburg, core zones are made up of 40% public, 52% private and 8% NGO-owned land, while the corresponding figures for external zones are 28% public, 71% private and 1% NGO-owned land. Obviously, it was much easier to set up core zones in areas owned by the state and by conservation-minded NGOs.

2.4 NATIONAL PARK STRUCTURE, FINANCES AND ZONATION

Hohe Tauern national park is located in the boundary region of three Austrian federal provinces (Salzburg, Carinthia, Tyrol, Fig. 2). Since nature conservation in Austria falls into the almost exclusive legal competence of provincial governments, the park consists of **three contiguous, but autonomous units, each with their own administration, budget, infrastructure, legal framework and management.** There is of course a joint corporate identity and a certain degree of co-ordination among the three parts, mainly concerning protected area and wildlife management, research, visitor management and marketing, but in many respects, **the three units of the park act quite individually.** Because there are three legal entities, IUCN also treats the three parts of the park as if they were separate protected areas. Although Austrian national parks are jointly financed and supervised by the federal and provincial governments, administration and daily business are very much a matter of the provincial governments, which provides a strong regional touch and secures close contact with local communities and stakeholders.

In the Salzburg part of the park, the national park´s administration has the status of an **approving authority** (of first instance in the case of national park core zones and special protected areas, of second instance for the external zones of the park). Enforcement of laws and regulations is supervised by the national park rangers.

Financing is based on contracts between the federal and the three provincial governments, each party contributing to the basic funds of the park (in Salzburg, 2/3 are provided by the provincial and 1/3 by the federal government). Additional money comes from sponsoring and corporate partnerships, from EU-projects and from economic activities of national park information- and education-centres. The total spending of Hohe Tauern national park amounted to 10.3 Mio € in 2011 (Salzburg: 4.8, Tyrol: 2.6 and Carinthia 2.9 Mio €, Bauch & Urban 2012, Stotter 2012, Oberdorfer 2012).

The **Salzburg part** of Hohe Tauern national park is the largest with **80.500 hectares**, followed by the **Tyrolean (61.100 hectares)** and **Carinthian (44.000 hectares) parts.** The three parts of the park share a common zonation system, distinguishing between **core zones** and **external zones.** In Carinthia and Salzburg an additional category has been implemented, the so-called **special protection areas.**

“Core zones” (**“Kernzonen”**, dark green areas in Fig. 2, Fig. 3) make up for a total area of **114,500 hectares** in the entire national park (Salzburg: 50,700, Tyrol: 34,700, Carinthia 29,100 hectares). This corresponds to 61.7% of the total area (S: 63.0%, T: 56.8%, C: 66.1%). **It is important to note that the core zones of Hohe Tauern national park were originally not conceived as strict non-intervention areas, when the national park laws were written in 1983 (Salzburg and Carinthia) and 1991 (Tyrol)** (Salzburger Landesregierung 1983, Tiroler Landesregierung 1991, Kärntner Landesregierung 1983). Although all

three legal texts clearly state that there should be no human intervention into nature and the landscape within the core zones, they invariably add a list of possible exemptions. Some of these exemptions make sense with respect to national park goals, but others are in open conflict with a strict non-intervention philosophy (details for Salzburg see below). Still, exemptions can only be granted after an official approval procedure. Beyond exemptions, all three national park laws state that activities relating to mountain agriculture (like pasturing, hay-making and the use and maintenance of the necessary infrastructure) **are not subject to any restrictions within the core zones.** In Carinthia and Salzburg, the same is true for low-intensity forestry. In all three provinces, lawful fishing and hunting are allowed within the core zones. **Thus, the national park laws do not substantially restrict major types of land-use within declared core zones.** This was not a problem, as long as IUCN-recognition for the national park was not an issue. By the mid-1990ies however, when the Austrian Ministry for the Environment began to set binding standards for Austrian national parks (making IUCN-recognition a prerequisite for the continued use of the label “national park”), solutions for this problematic situation had to be found.

Fig.3. Sign announcing core zone

In the event, the legal texts were not changed, **but compliance with IUCN-criteria was sought through contractual arrangements with land-owners and land-users.** This was relatively easy for barren, totally unproductive land, as well as for land belonging to alpine

clubs and conservation NGOs that had readily supplied their property for the establishment of the park and were not interested in any extractive forms of land-use. But for core zone-areas owned by individual farmers, farmers association or the Austrian Federal Forests, negotiations on compensation payments or permanent lease of land-use rights had to be taken up, quite some time after national park establishment. The land-use rights in question mostly referred to grazing and hunting. This was a lengthy and complicated process, which took almost 10 years to be completed. Eventually, all three parts of the park came up with contracts, **securing non-intervention management on at least 75% of the existing core-zones and thus complying to IUCN-regulations.** On this basis, IUCN-recognition for the Carinthian part was reached in 2001, for the Salzburg and Tyrolean part in 2006. IUCN-recognition as a category II protected area was granted to each legal entity separately and independently; it always refers to the entire park area and includes both core and external zones. For the purposes of the present report, it is important to note that there are ***de facto* two categories of core zones in Hohe Tauern national park** (Nationalpark Hohe Tauern 2003):

a. **core zones without any extractive land-use, where natural processes can unfold freely**
b. **core zones with ongoing, low-intensity land-use** (mostly grazing and hunting)

In Salzburg, **core zones without any extractive land-use amount to 40,000 hectares, which corresponds to 78.9% of the total core zone area.** While all three parts of the park have eventually achieved the required proportions for the two types of core zones, the delimitation of non-intervention zones was always strongly influenced by acceptance problems and financial constraints. For this reason, any discussion about future enlargements of non-intervention zones is a very sensitive and delicate matter. **Setting up a wilderness area, as planned in Salzburg, is currently only feasible on land where there is already full agreement about compensation issues and where land owners will not try to link their consent to the outcome of still pending negotiations in other parts of the park.** This actually excludes land owned by farmers associations from any wilderness considerations.

Nature based tourism is an important issue in the core-zones. The laws generally seek to secure its low-impact character and its ecological sustainability (details for Salzburg see below).

In the original concept of park zonation, wilderness goals in Hohe Tauern national park were best met in the **“special protection areas” (”Sonderschutzgebiete”**, yellow areas in Fig. 2). They are a legal relic from the early times of park development, before there was a clear official commitment to the IUCN-directives on zonation. Special protection areas were meant to protect comparatively small patches of highly valuable, sensitive or pristine habitats **from any human impact** and can be seen as small-scale precursors of today´s non-intervention core zones. With the IUCN-zonation in place, they have largely lost their significance, at least where they overlap with non-intervention core zones. In Salzburg, the special protection areas will therefore soon be abolished as a legal instrument (already existing areas of this type will of course be maintained!).

Currently, the special protection areas in Salzburg amount to a total of 3,200 hectares, in Carinthia to 3,600 hectares. In Tyrol no such area has ever been implemented, despite the existing legal possibility. Special protection areas thus make up 3.6% of the entire national park area.

The majority of land with continuing use is located in the so called **"external zones"** of the park (**"Außenzonen"**, light green areas in Fig. 2). Despite their somewhat confusing name, these zones are an integral and important part of the protected area. They explicitly focus on the preservation of typical, ancient cultural landscapes and their associated biodiversity. Here, traditional forms of land-use, like pasturing, hay-making and extensive-forest use are maintained, and even encouraged. The traditional / low-intensity character of these activities is secured not so much through regulations and restrictions, but rather through targeted subsidies (e.g. for the use of traditional building materials in fences and huts, or for the maintenance of low-intensity grazing and mowing regimes, etc.). Of course, this is a delicate affair, with many compromises to be made, as even low-intensity forms of modern agriculture must differ from truly traditional practices, if they are to be economically viable. The availability and use of machinery alone leads to quite different necessities, opportunities and outcomes, starting with the inevitable access infrastructure and ending with a much higher degree of impact on the managed ecosystems in many instances. Still, land-use intensity in the external zones is definitely low, when compared with areas outside of the park.

Since their establishment, external zones have repeatedly played a crucial role in warding off destructive projects. For instance, there were proposals to open up the long valleys on the northern slopes of the Hohe Tauern to public traffic, or to establish skiing resorts within the national park. Due to the relatively strong legal status of external zones, it is not possible to overrule conservation priorities by claims of overriding public economic interest in such projects.

Nature based tourism is an important factor in the external zones and a number of arrangements and incentives are in place to secure its environmental sustainability. In both agricultural and touristic facilities, the national park supports and promotes alternative methods of energy production, mobility, transport and waste management.

External zones cover a total of 64,300 hectares, or 34.6% of the park area (S: 26,600, T: 26,400, C: 11,300 hectares).

Without regard for its internal zonation, Hohe Tauern national park has the status of a Natura 2000 area in all three provinces, both under the Birds- and the Fauna Flora Habitat-directive. This further strengthens protection of the entire area and has promoted many research- and monitoring activities, concerning conservation status and management of relevant species and habitats . It also provides funding opportunities for active conservation and restoration measures, within the frame of LIFE- and Rural Development projects.

It is interesting to note that **much of the past external communication of the national park has focussed on the value of alpine cultural landscapes and on the harmonious coexistence of man and nature within the external zones and the core zones**

with ongoing land-use. This was certainly due to the necessity of increasing acceptance and support among local stakeholders and land-users, but it has directed public perception towards an aspect of the park that is not really central to the national park idea, as conceived by IUCN. **Only recently have wilderness aspects of the park gained more weight in the communication activities.**

2.5 CORE ZONE RULES IN THE SALZBURG PART OF THE PARK

As the proposed wilderness area will be located on land declared as national park core zone and special protected area, it is important to have a closer look at the rules for these particular zones.

SPECIAL PROTECTION AREA

According to § 6 of the Salzburg national park law (Salzburger Landesregierung 1983), the purpose of **a special protection areas is to fully preserve sites of special significance with respect to landscape or ecological features, including their animal and plant life.** Such areas may either be located within national park core zones, or within external zones. Their establishment requires the full consent of all land-owners or land-users that may be substantially impaired in their rights – meaning that they must be compensated for any economic loss resulting from the declaration of the area. **In special protection areas, any human intervention into landscape and nature is forbidden.** There are some general exemptions to this strict non-intervention approach and the provincial government can grant specific exemptions as well, but only insofar, as they do not come in conflict with the overall goals of the protected area.

The regulation by which the special protection area was eventually set up goes into more detail (Salzburger Landesregierung 1995). Under § 2, it repeats the overall purpose of the area, as already stated in the national park law and adds that the reserve shall secure the natural evolution of a high mountain area and preserve its landscape character and pristine state.

Under § 3, lit. 2, the regulation specifies the **general exemptions** to the above mentioned, strict non-intervention rules. General exemptions concern a) the maintenance of existing trails, b) the access for hiking, climbing and ski-touring, c) measures related to existing grazing and forestry easements, d) lawful hunting (as far as not further restricted in the regulation, see below), e) the maintenance of markings and signs concerning land property.

Under § 3, lit. 3 the regulation specifies which kind of interventions are explicitly **forbidden within the special protection area.** These are: a) forestry measures; b) hunting, with ex-

emption of Roe deer and Red deer-hunting and when retrieving game shot outside the area; c) feeding of wildlife (both game and non-game species); d) releasing/introducing game; e) constructing or installing any devices for hunting and game management; f) collecting of minerals and fossils, disrupting the soil surface; g) polluting or impacting the area by storing, discarding or spilling any kind of waste or other material; h) setting up tents and bivouacs, except near trails and on specified sites, setting up fire places, lighting fires, smoking; i) collecting berries, mushrooms and other plants, or any parts thereof; j) impacting or modifying the vegetation; k) leading dogs, except for hunting purposes; l) horse riding; m) making avoidable noises; n) driving vehicles, including skidoos; o) using aircraft (motorized or unmotorized) flying lower than 5,000 m a.s.l., which is also valid for military and police training flights; p) performing agricultural activities, including mountain pasturing.

Under § 3, lit 4 the regulation states that the prescribed game management plan for the wider area has to take the rules of the special protection area into full account; the plan must be adapted on the basis of scientific expertise provided by the national park.

§ 4 of the regulation lists the specific exemptions that may be granted by the authorities, provided that they do not interfere with the overall goals of the special protected area. After careful consideration – and, if necessary, under additional conditions or on a temporary basis only – exemptions may be granted for: a) scientific research activities; b) the maintenance and – if needed – reconstruction of existing buildings (not valid for hunting installations); c) the maintenance and marking of existing trails, paths and resting sites; d) measures related to the supervision and management of the special protection area; maintenance measures securing human settlements against natural hazards; e) mechanical forestry sanitation measures, but only to the extent deemed absolutely necessary; f) shooting and catching of Chamois, if this should become necessary for ecological reasons (and only, if natural regulation cannot be expected to reduce the population within a foreseeable time span); g) control measures for wildlife epizootics, but only to the extent deemed absolutely necessary; h) scientifically supervised reintroduction programmes for extinct species; i) catching of wildlife for relocation purposes; j) training activities of mountain rescue services.

Altogether, the rules set out in the regulation for the special protection area come remarkably close to those for a wilderness area. With some modifications (outlined in sections 4. and 5.), they might indeed serve as a model for the regulation by which the planned wilderness area can eventually be set up.

NATIONAL PARK CORE ZONE

The legal text about core zones (§ 5 of the Salzburg national park law) is older than the regulation for the special protection area and in many respects also less strict. It first states that core zones consist of areas that are either completely or largely in a “primeval state”; the main public interest in these areas lying in the “preservation of nature in its entity”. Therefore, within core zones, any intervention into nature is forbidden, as well as any impact on the landscape. But then, the text adds a series of exceptions to this general non-intervention statement. These exceptions may be granted for specified measures and activities. They fall basically under two categories:

The first category requires **authorization by the provincial government**, under the provision that the implementation will not impair the overall goals of the core zone. It encompasses:

- Damage prevention measures with respect to avalanches, land-slides and floods (including technical installations and infrastructure)
- Measures securing the achievement of conservation goals of the national park
- Measures relating to scientific research
- Measures and activities related to the building and adaption of pasturing huts, touristic huts, touristic shelters, access roads to pastures and huts, touristic tracks and paths, as well as summit crosses
- Regular forestry, beyond harvest for the supply of pasturing activities (see below)
- The use of low-flying aircraft (but not for touristic or sportive purposes)
- Measures and activities relating to building and adaption of energy supply installations for pasturing and touristic huts

The second kind of measures and activities needs no authorization, as these measures were considered to comply with national park goals when the law was written. They comprise:

- All activities within the framework of pasturing
- All measures required for the maintenance of previously authorized technical installations
- All activities and measures relating to the supply and maintenance of pasturing and touristic huts, including waste disposal/treatment, insofar as they are not related to building of new installations
- Low intensity forestry for the supply of pasturing activities (provision of fuel wood, building material for huts and fences)

Hunting, fishing and tourism are dealt with in § 3 of the national park law. According to this paragraph, hunting and fishing are not subject to the national park law, as long as they are performed in accordance with the existing provincial laws and regulations. This means in practice that hunting and fishing have the same status within and outside the park. The only exception refers to special protection areas, where different regulations may be in place. Similarly, § 3 specifies that conventional hiking and mountaineering, ski-touring, cross country skiing, etc. are not subject to the national park law. Thus, low-intensity nature-based tourism is possible on the entire park area.

Of course, such core zone rules will not secure a true non-intervention management regime. Rather, they put some restrictions and limitations on human activities and impact, but otherwise allow for a continuing, low-intensity land-use.

This is clearly less than what is expected for a national park core zone under IUCN-rules. Therefore, from the mid-1990ies onwards, **compliance with IUCN criteria had to be sought through contractual arrangements with land-users, the effective implementation of non-intervention management becoming dependent on financial compensation schemes and the lease of land-use rights in the process.** By reaching such contractual arrangements, the national park has successfully transformed **a substantial portion its original core zones into core zones without any extractive land-use. The proposed wilderness area is exclusively located on land, where all land-use rights have been compensated.**

The above analysis of the national park laws and regulations **clearly demonstrates the added value of setting up a wilderness area within the boundaries of the park.** Those core zones of the national park that presently conform to the rules of an IUCN category II-area certainly provide for a high degree of nature protection by excluding extractive forms of land-use, but they do not secure a full non-intervention management regime, as the core zones of a wilderness area would. **Upgrading suitable areas within the existing core zones will therefore help to reinforce and to secure the wilderness character of the most natural and least modified parts of the Hohe Tauern landscape.**

3. THE PROPOSED WILDERNESS AREA

3.1 NATURAL FEATURES

Topography, rivers and glaciers: the proposed wilderness area is located in the north-western part of Hohe Tauern national park. It covers an area of **9,761 hectares** along the main ridge of the Hohe Tauern range and in the valley heads of Krimmler Achental, Obersulzbachtal, Untersulzbachtal and a small portion of Habachtal (Fig. 4 and 5). The highest point is Großvenediger (3,660 m a.s.l), the lowest point is at 1,654 m a.s.l., in the Untersulzbach valley. Within the confines of the area, there are 29 named peaks and another 42 unnamed elevations exceeding 3000 m in height (OeAV 1998). More than 16 glaciers are found in the area, among them the third largest in Austria, the Obersulzbachkees, whose ice-sheet covers an area of 11 km² and is up to 184 m thick (ZAMG 2012a, Fig. 6). Four rivers – the Krimmler Ache, the Obersulzbach, the Untersulzbach and the Habach drain the area towards the northwest, together with their many tributaries. All four rivers eventually flow into the Salzach, which is one of the major Austrian rivers feeding the Danube. The discharge of the glacier-fed rivers is considerable (Table 1, Hydrographischer Dienst Salzburg 2012, Slupetzky & Wiesenegger 2007) and follows a characteristic seasonal pattern, with high flows in summer that may exceed the low ones in winter by a factor of 30-40. During summer there is also a pronounced daytime-pattern, with peak flows occurring in the late afternoon and early evening hours of hot summer days, when melting water from glaciers and snowfields rushes down the streams (Fig. 7). Summer evening peak flows can exceed morning lows by more than 60% (Slupetzky & Wiesenegger 2007). Spectacular floods may occur, when high melting rates of glaciers combine with sudden downpours from heavy thunderstorms. Peak flows like the ones mentioned in Table 1 are absolutely devastating and may deeply modify the landscape of the valleys.

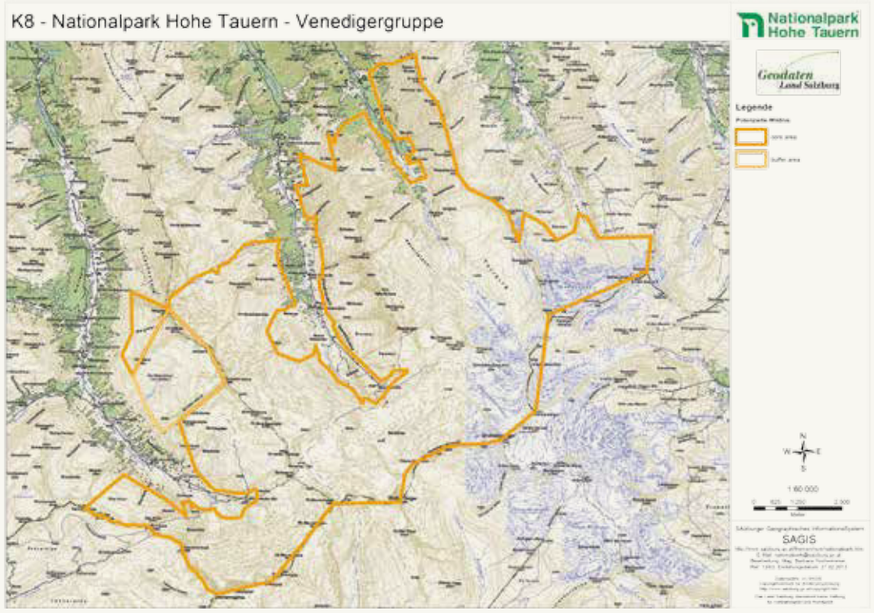

Fig.4. Delimitation and zonation of the proposed wilderness area.
Dark orange line: delimitation of wilderness core zone; light orange line: wilderness buffer zone

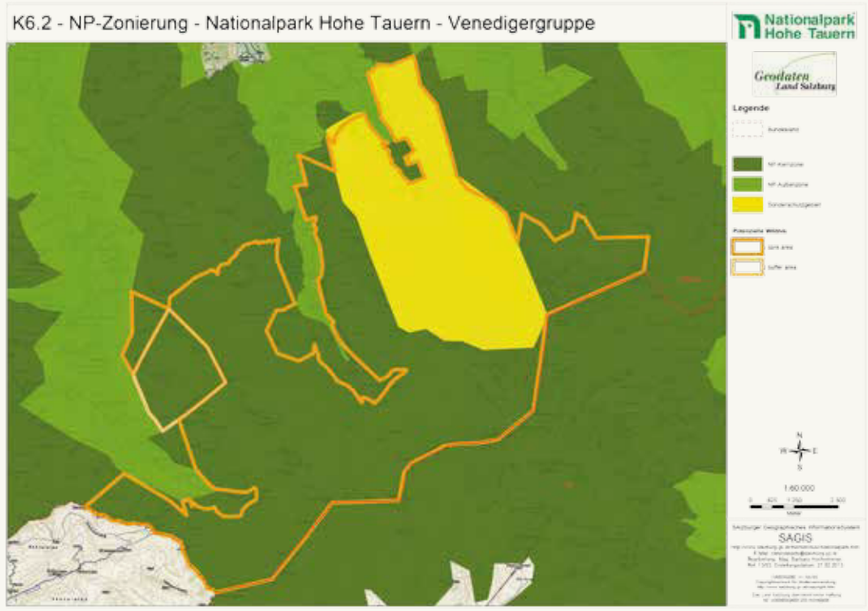

Fig.5. The proposed wilderness area and the existing national park zonation.
Dark orange line: delimitation of wilderness core zone; light orange line: wilderness buffer zone.
Dark green areas: national park core zone; light green areas: national park external zone;
yellow areas: special protection area.

Fig.6. Obersulzbach glacier

Fig.7. Obersulzbach river

The largest of the four rivers, the Krimmler Ache, is famous for its spectacular waterfalls, located at the entrance to the valley, 18 km downstream from the wilderness area. Here the river tumbles down a 380 m high flank in several cascades (Lainer 2007). The Krimmler waterfalls are one of the major tourist hot-spots in Austria, attracting an annual average of 400.000 visitors. Despite this huge gathering of people at its entrance, the largely uninhabited Krimmler Achental is almost as quiet as any other valley in the national park. Visitation drops to normal levels immediately behind the waterfalls. At the upper end of the valley, 20 km from the falls and at the very border of the wilderness area, Warnsdorfer Hütte registers average annual visitor numbers around 3,000 persons (see Table 2).

Table 1. Hydrography of the rivers originating in the wilderness area
(sources: Hydrographischer Dienst Salzburg, 2012 and Slupetzky & Wiesenegger, 2007)

River	Catchment Size	Annual average flow	Minimum flow	Maximum flow	Period
	km²	m³/s	m³/s	m³/s	years
Habach	45,3	2,2	0,2	44,7	1980 – 2009
Untersulzbach	40,5	2,1	0,1	38,7	1971 – 2009
Obersulzbach	80,7	4,7	0,1	100,0	1961 – 2009
Krimmler Ache	110,7	5,6	0,2	180,0	1975 – 2005

Vegetation: The proposed wilderness is essentially an area of high mountains, covering the subalpine (1650-2100 m a.s.l.), alpine (2100-2800 m a.s.l.) and nival (> 2800 m a.s.l.) altitudinal belts. Large parts of the area fall into the alpine and nival zone. Accordingly, much of the ground is covered by glaciers and permanent snow (32%) or by rocks, boulders and scree (40%), while sparsely vegetated areas account for a further 20 %. Natural alpine grassland is found on 5.3%, subalpine coniferous forests on just 1.3% of the area (Fig. 8, Table 3).

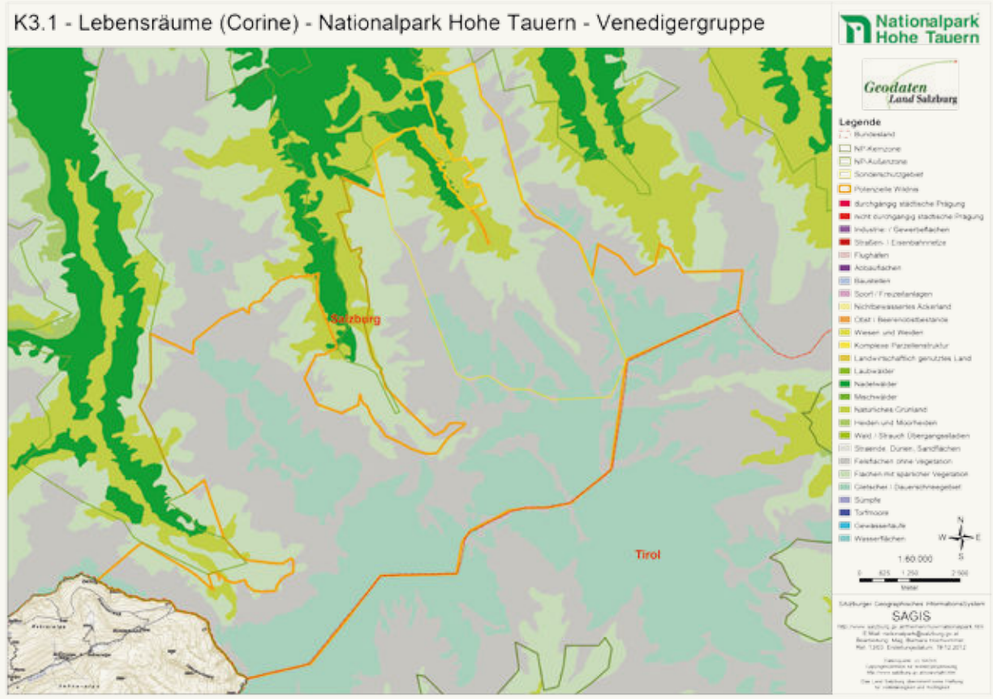

Fig.8. Major habitat types in the proposed wilderness area, according to CORINE-land cover data. Blue-green: glaciers; grey: rocks, boulders and scree; light green: sparsely vegetated ground; medium green: natural grassland; dark green: coniferous forest.

Table 2. Extent of major habitat types

Habitat type	ha	%
Glacier and permanent snow	3.218,79	32,29
Rocks, boulders and scree	4.041,68	40,54
Sparsely vegetated areas	2.048,98	20,55
Natural Grassland	526,58	5,28
Coniferous Forest	133,75	1,34
Total	**9.969,78**	**100,00**

Plant cover in the upper nival zone is extremely patchy and limited to ice-free rocky outcrops (Fig. 9). It consists of a handful of vascular plant species, mosses, lichens and algae. A specialised group of algae even thrives on the snow surface. In the lower nival (subnival) zone, the sparse vegetation is again dominated by mosses and lichens, with some interspersed vascular plants, often growing in cushions and tiny carpets (Fig. 10). There is much open and unvegetated soil in this zone, however. A more or less continuous plant cover only develops in the

alpine altitudinal belt, which is the natural realm of alpine grasslands. Dense mats of short and sturdy grasses, strewn with colourful flowers and aromatic herbs are a characteristic feature of that zone (Fig. 11). But even here, unvegetated ground remains on windswept ridges, in gullies and in snow-filled hollows, on rocks, boulders or scree fields. In the lowest part of the alpine zone, shrubs like Alpine Rose *(Rhododendron ferrugineum)*, bilberry (*Vaccinium myrtillus)*, cowberry *(V. vitis-idea)*, etc. invade the grasslands. These shrubs naturally form a narrow belt of heathland along the tree-line and they also grow profusely as understorey in the open forests of the upper subalpine belt. Due to anthropogenic forest clearance, the subalpine heaths often cover much larger tracts of land than under natural circumstances. In wet places and on abandoned pastures, dense thickets of green alder *(Alnus viridis)* may develop (Fig. 12); on dry stony soils, they are replaced by equally impenetrable stands of dwarf pine *(Pinus mugo)*. The forest in the uppermost subalpine belt is essentially dominated by Stone pines *(Pinus cembra)* (Fig. 13) and Larches *(Larix decidua)*, which are replaced downhill by almost pure stands of Norway Spruce *(Picea abies)*. The latter are typical for the lower subalpine zone and – under the continental climate conditions of the Central Alps – even for the entire montane forest belt.

Fig.9. Barren moraines and scree fields

Fig.10. Subnival lichen community

Fig.11. Alpine meadow in full flower

Fig.12. Alder scrub in Untersulzbach valley

Fig.13. Stone pine, dwarf pine and alder scrub along tree line

Climate: The climate of the area is in fact very harsh. As there is no weather station close to the proposed wilderness area, climate data from a comparable location in the central part of Hohe Tauern (Moserboden, 2036 m a.s.l., 30 km east of the area) may serve as an illustration (ZAMG 2012, Hydrographischer Dienst 2012). In the period from 1971 to 2000, annual average temperature at this station reached 1.4°C, with an average value of -5.2°C for January and 9.1°C for July. Annual extremes ranged from -28.7 °C to 24.4°C. Temperature dropped below freezing on 201.4 days/yr on average, and remained permanently there for 80.6 days. The ground was snow covered on 225.6 days/yr, maximum snow depths reaching 330 cm in late winter. Continuous winter snow cover lasted on average from the 8th of November to the 23rd May, the earliest date being the 3rd of October, while the latest thaw occurred on the 19th June. The annual precipitation sum amounts to 1,496.4 mm on average, half of which fell between June and September. There were 64.4 bright days (with a cloud cover below 20%) and 144.4 overcast days/yr (cloud cover > 80%). Annual average wind speed amounted to 2.4 m/s, with strong winds occurring mostly during the winter months. Wind speeds exceeded 6 Beaufort on 18.0 days/yr, more than 8 Beaufort were registered on 6.89 days/yr on average.

3.2 WILDERNESS QUALITY

A recent effort to model Austria´s wilderness potential (Plutzar 2013) provides the opportunity to evaluate the wilderness quality of the proposed area. The model is based on the wilderness-continuum concept of the Australian Heritage Commission (Lesslie et al. 1993). This approach assigns to each locality a quantitative wilderness quality index. The index consists of the evaluation and integration of four different components:

1. Remoteness from settlements (the distance to permanently inhabited places)
2. Remoteness from access (the distance to established traffic routes)
3. Apparent naturalness (the presence of permanent civilization facilities)
4. Biophysical naturalness (the presence of biophysical disturbance caused by industrialized society)

The results of the modelling exercise show **that extensive tracts of land in the Hohe Tauern range attain the highest wilderness quality index** (dark green areas in Fig. 14.) In fact, the western portion of the Hohe Tauern range belongs to the largest contiguous wildernesss block in Austria. An enlargement of the map (Fig. 15) shows that the proposed wilderness area is located well inside that block. But the map also illustrates the sensitivity of wilderness quality to infrastructure. In Krimmler Achental and Obersulzbachtal, the otherwise continuous dark green area is broken up in several smaller blocks, due to the presence of the dirt roads on the valley floor, the two huts and by some of the hiking trails. In contrast to this, wilderness quality appears completely unimpaired in the upper reaches of Untersulzbachtal, where there are neither huts, roads nor trails.

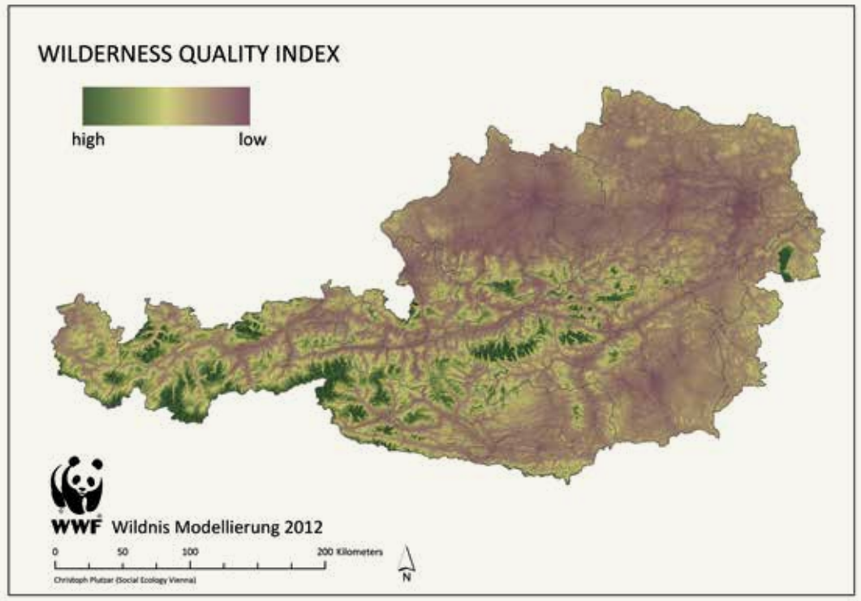

Fig.14. Wilderness quality index of Austria (Plutzar, 2013)

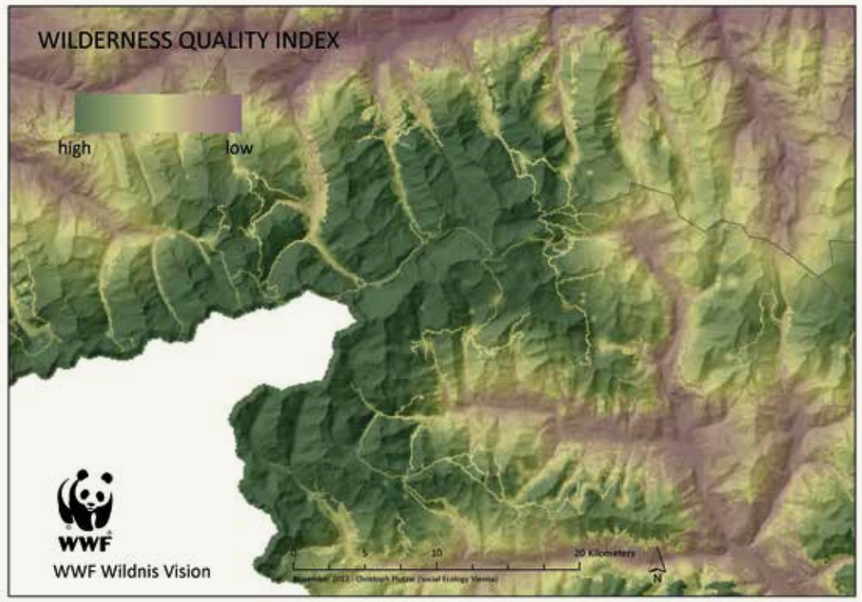

Fig.15. Wilderness quality index of Hohe Tauern area (Plutzar, 2013)

3.3 LAND OWNERSHIP

There are only two landowners within the proposed wilderness area, the Austrian Federal Forests and a conservation NGO from Germany, the Verein Naturschutzpark e.V. (Fig. 16).

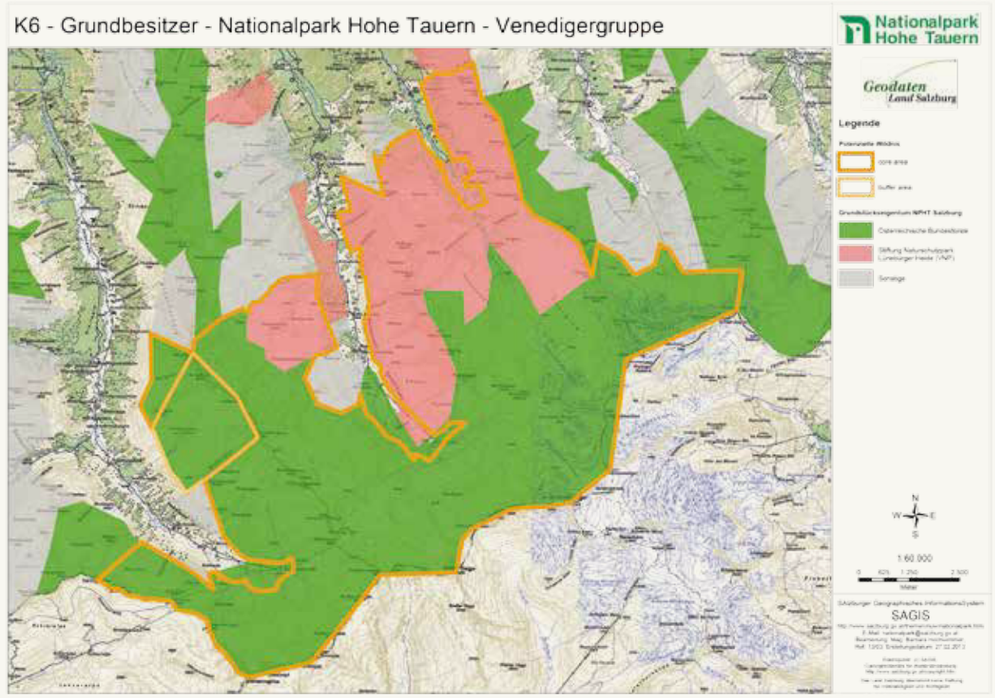

Fig.16. Land ownership within the proposed wilderness area.
Green: Austrian Federal Forests (ÖBf); pink: Verein Naturschutzpark (VNP).

Land owner profile:
The Austrian Federal Forests (Österreichische Bundesforste AG, ÖBf) were originally founded in 1925 and reorganized as a stock corporation in 1997. The sole shareholder of the stock company and owner of all ÖBf land is the Republic of Austria. The Austrian Federal Forests manage 10% of Austria´s territory (857,000 hectares, 512,000 of which are forests), they own 74 lakes and several river sections and administrate 121 forestry, 1,280 hunting and 425 fishing districts. 50% of ÖBf- land is protected, the company is a major landowner in 3 Austrian national parks, to which it has contributed a total of 52,000 ha. In two of these parks (Kalkalpen and Donau-Auen), it is closely involved in park management and administration. ÖBf also owns substantial parts of the Wienerwald Biosphere Park and of the Wilderness Area Dürrenstein. 26,000 hectares of ÖBf-land are under Natura 2000 protection. The Austrian Fe-

deral Forests have to care for a total of 147,000 hectares of protective forest and for substantial drinking water resources. In many regions they also supply and maintain touristic infrastructure and provide access to important recreational areas.

Still, the company is not just the manager and protector of Austria´s public natural assets, it is also clearly profit-oriented. For the right to use the Republics resources, it pays an annual usufructuary royalty, amounting to 50% of its net profit. The core business of ÖBf is forestry management, it provides timber to sawmills, to the paper-, pulp- and cardboard-industries and it delivers fuel to biomass power plants. It has a renewable energy department and is involved in small hydropower-, biomass-, wind- and solar-power projects. Real estate management, the lease of hunting and fishing rights, as well as the provision of forestry services to other landowners are important business sectors as well (ÖBf 2012).

In the context of Austrian national parks, the Austrian Federal Forests are treated as all other landowners. Whenever their land-use rights and economic activities are subject to conservation restrictions, the company is entitled to full compensation. This may seem paradoxical at first sight, but it is a logical consequence of the radical outsourcing exercise, the former state enterprise underwent in 1997.

Within the proposed wilderness area, the Austrian Federal Forest own a **total of 6,973 hectares,** which corresponds to 71.4% of the entire area (Table 4, dark green areas in Fig. 16). 85% of that land has the status of a national park core zone, while 15% are designed as special protection area. Land use rights (referring to hunting and grazing) have been compensated on almost all of this land, except for the sheep grazing rights on **502 ha** of national park core zone in the Krimmler Achental, to the northwest of Warnsdorfer Hütte. These grazing rights result from an old easement to the benefit of a farmer and are not exerted at the moment. Still, to secure full non-intervention management, it is necessary to compensate these rights, even if grazing has ceased there some time ago. **As the matter cannot be settled quickly, the national park proposes to declare this area as wilderness buffer zone, which might become core zone as soon as a contractual agreement is reached.** On an adjoining patch with a comparable situation, the national park has recently reached a private agreement with the relevant farmer, which only remains to be confirmed by the agrarian authorities. This patch of land will be included in the wilderness core zone from the outset.

The second land-owner in the proposed wilderness area is the german **“Verein Naturschutzpark e.V.” (VNP).** Founded in 1909 by a group of scientists, writers, clergymen and teachers, this is arguably the oldest surviving conservation organisation in Germany and certainly one of the oldest in Europe. In its early days, the association was influenced by the American national park movement and by the successful private initiative that has led to the establishment of the Swiss national park in 1914. On these models, the association planned to set up large protected areas in Germany and Austria, by acquiring land with the help of donors and supporters. The idea was to establish such areas across all major landscape types of central Europe. Eventually, VNP achieved its goals in the lowlands of northern Germany, where it developed the famous Naturpark Lüneburger Heide and in the Austrian Alps, where it acquired substantial amounts of land in the Hohe Tauern. During the Second World War and in the economic boom years that followed, much of the association´s possessions in the central part

of Hohe Tauern were lost to hydropower development, to the building of a motorway and to the construction of the transalpine oil-pipeline. The association therefore shifted its activities to the western portion of the mountain range, where it had acquired land in the Untersulzbach- and Obersulzbach-valleys. For many decades, these areas were run as private protected areas. When the national park was eventually created, VNP was proud to bring these valuable possessions under the powerful legal roof of the park. It turned out that the association had done an excellent job in keeping at bay all development attempts and by reducing extractive land use to a minimum – the area in the Untersulzbach Valley proved to be of such outstanding quality, that it was declared a special protection area in 1995. Today, the association owns 3,500 hectares within the national park (Makowski 2009, Stadler & Zimmermann 2009).

Within the proposed wilderness area, 2,774 hectares (28,6% of the total area) belong to VNP (Table 4, areas shaded pink in Fig. 16). 1,575 hectares have the status of a special protection area, while 1,199 ha belong to the national park core zone.

Table 3. Landownership in proposed wilderness area

Total area in ha	**9.731**
core area	9.228
buffer area	502

Owner	Total	*Spec. Prot. Area*	*NP core zone*
OeBf-area in ha	6.956	1.047	5.909
VNP-area in ha	2.774	1.575	1.199
Total	9.731	2.623	7.108

Owner	Total	*Spec. Prot. Area*	*NP core zone*
OeBf-percentage	71,49	39,94	83,13
VNP-percentage	28,51	60,06	16,87
Total	100,00	100,00	100,00

	ÖBf	VNP
Zone	%	%
Special Prot. Area	15,06	56,77
NP-core zone	84,94	43,23
Total	100,00	100,00

3.4 CURRENT PROTECTION STATUS

The area proposed as wilderness is currently protected as special protection area (2,622 hectares, 26,9%), national park core zone (7,108 ha, 73,0%) (Fig. 5). Of these, 9,228 ha (or 94.8% of the proposed total of 9,731 ha) will be declared as wilderness core area, while 502 ha will be wilderness buffer area, as long as the issue of grazing rights is not settled.

To the north and east, the proposed wilderness area is well embedded in the Salzburg part of Hohe Tauern national park, whose outer borders come nowhere closer than 3 km to the outer borders of the wilderness area. To the south, the wilderness border follows the provincial border with Tyrol, running along the main ridge of the Hohe Tauern mountain range. On the Tyrolean side, all land is national park core zone for a depth of at least 3 km. Along a 5 km stretch in the southwest, the border of the wilderness area coincides with the state border between Austria and Italy. The adjoining land on the Italian side is also protected, by the Naturpark Rieserferner-Ahrn/Parco Naturale Vedrette Ries-Aurinia (corresponding to an IUCN category V protected area). The wilderness core is thus surrounded everywhere by protected land. From southwest to northeast, the wilderness area is up to 16 km wide, from north to south its width varies between 1.9 and 11km. Overall, the shape of the area is rather compact, but with two deep indentures in the Krimmler Achental and the Obersulzbachtal.

4. COMPLIANCE TO THE WILD EUROPE CRITERIA

4.1 SIZE AND ZONATION

As the proposed wilderness area has a size of **9,731 hectares** (of which 9,228 ha are to be **wilderness core zone** from the outset), the minimum size criterion (10,000 ha) of Wild Europe is almost met. According to the new European Wilderness Quality Standard and Audit System, the area would thus qualify for the “Gold Standard” (missing the size criterion for the “Platinum Standard” by just a few hundred hectares). Since the wilderness core is larger than 8,000 hectares, a **buffer zone** would not be necessary according to Wild Europe rules. However, for the reasons outlined above, an area of 502 hectares will be declared as buffer zone, as long as the issue of grazing rights is not settled.

Declaration of a transition zone is highly recommended by Wild Europe for all wilderness areas. The situation in the Hohe Tauern wilderness area is special, however, as the **wilderness core is either surrounded by national park core zones or by national park external zones** (on 80% and 20% of the areas perimeter, respectively). The depth of these adjoining zones varies from several hundred meters to several kilometres (see Fig. 4 and 5). Along a section of approximately 5 km, the border of the wilderness coincides with the Austrian state border to Italy. **On the Italian side, there is a protected area as well, the Parco Naturale Vedrette di Ries-Aurinia/Naturpark Rieserferner-Ahrn** (total size 31,500 hectares). Its status corresponds to a IUCN category V area. **The Austrian national park core zones, external zones and the Italian nature park might easily qualify as de-facto wilderness transition zones. Therefore it may not be necessary to delimit a separate transition zone for the wilderness area, the nearest outer borders of the national park in Austria and the nature park in Italy could serve this purpose as well.** Given the large size of the both parks, the resulting size of the de facto-transition zone clearly exceeds the requirements of Wild Europe (“minimum size should aim to be at least a quarter of the total core/buffer/transition zone area”).

The **proposed wilderness core area is contiguous,** so no plans for future amalgamation of separate core areas are needed. This doesn´t of course preclude future extensions of the core. However, for the reasons given in section 2.4, an extension seems not feasible within the next years (except of course for the small area now declared as buffer zone).

4.2 BIODIVERSITY

Biodiversity features dependent on human management interventions (like grazing, mowing etc.) do not figure prominently among the values of the proposed wilderness area. Of course, parts of the area have been grazed in former times, but with the establishment of strict non-intervention core zones by the national park, grazing by domestic animals has stopped and natural succession can take its course. This is certainly not a conservation problem, as large tracts of the national park are managed for their anthropogenic biodiversity, which seems well-cared for (concerning grazing by wild ungulates see section 4.3). Rather, the establishment of a wilderness area will support those components of biodiversity which depend on strict non-intervention management and on unrestrained natural processes. As these components have received less attention in the past, setting up the wilderness area will increase the beneficial effects of the national park on overall biodiversity.

The wilderness area seems to be large and varied enough to reduce the likelihood of chance extinctions in local animal or plant populations. Even if such extinctions would occur, connectivity to surrounding, very similar habitats is excellent and natural re-colonisation is probably a realistic option.

4.3 NATURAL PROCESSES

Unrestrained action of extremely violent, landscape-shaping processes is a very obvious feature of the proposed wilderness area. Avalanches, rock falls, land-slides, floods, storms, extreme temperatures and the periodic recession/advance of glaciers are continuously shaping and modifying the area. Due to their nature and intensity, none of these processes is actually controllable by man, or has ever been controlled in the past; in former times, there may have been local attempts to restore marginal grazing land after rock falls, floods and avalanches by removing the stones that covered the pastures after such catastrophic events. The same is still true for access roads and paths. But all these interventions are negligible with respect to the frequency, scale and intensity of the processes in action. They have at best resulted in minor modifications of the landscape, mostly at the periphery of the proposed wilderness area.

The natural vegetation dynamics of the area have certainly been influenced by man in the past. On large parts of the proposed wilderness area, grazing by domestic sheep and goats occurred right up to the margins of glaciers and snowfields and has acted on alpine plant communities for centuries, if not millennia. Temporally, sheep and goat grazing must have replaced the natural grazing impact of Ibex *(Capra ibex)* and Chamois *(Rupicapra rupicapra)* that were either driven to extinction (Ibex, 18th century) or strongly reduced in numbers (Chamois, 19th century). With the recession of sheep husbandry during the 20th century, the restoration of

Ibex and Chamois populations and the eventual establishment of strict non-intervention zones by the national park, a near-natural situation with regard to grazing has been restored on the high altitude portions of the area – that is: on the majority of the area.

Human impact on vegetation was more complicated on the lowest portion of the wilderness area, just above and along the tree line. Here, the natural extent of grasslands and subalpine scrub has been substantially expanded through human forest use and clearance (mainly for grazing, but also as a result of the high wood demand for mining, salt processing and domestic use). Grazing by domestic livestock (today cattle and some horses, in former times also sheep and goats) and active management of pastures has kept the large tracts of the landscape treeless for centuries, if not millennia. Discontinuing grazing and forestry in these areas certainly removes human impact, but does not fully restore the natural situation, as grazing by wild ungulates must have been an important factor in the original mosaic of forests, shrub and grassland. Parts of the wild ungulate spectrum (Chamois *Rupicapra rupicapra* and Red Deer *(Cervus elaphus)*) are again present and act on the vegetation, but large herbivores as European Bison *(Bison bonasus)* and Moose *(Alces alces)* were exterminated before the Middle Ages. As these species must have visited the areas around and above the tree-line only in summer and performed long-distance migrations to their winter ranges in valley bottoms, there is no realistic perspective for their restoration. The nearest large, low-lying valley that might once have served as Bison and Moose winter range, the Salzach-valley, is nowadays densely settled and heavily modified by humans, leaving no room for herbivores of that size (not to mention the conflicts with forestry and agriculture that would arise along their migration routes). Still, the absence of Bison and Moose might not be a problem for the wilderness area in its present delimitations, as it consists largely of habitat that was always unsuitable for these species. In former times, only the margins of the present-day wilderness area must have been accessible to them. In the majority of the area, the current spectrum of wild ungulates can be considered as complete.

Predation by large carnivores is another natural process to be considered. Wolf *(Canis lupus)*, Brown Bear *(Ursus arctos)* and Lynx *(Felis lynx)* have disappeared from the northern slopes of Hohe Tauern in the 19th century (Stüber & Winding 2007). The prospects for their return are much better than for Bison and Moose, however: Wolves are currently recolonizing the Austrian Alps, and is only a matter of time before they will turn up in the national park again. Migrating Brown Bears from Slovenia and from a reintroduction project in Northern Italy have already visited parts of the park. Lynxes are currently being reintroduced to the north-eastern Alps and stray individuals have been recorded in the Hohe Tauern during the last decades on several instances (Large Carnivore Team WWF Austria, unpubl.) Still, the three large carnivore species have not established permanent populations in the Austrian Alps and thus cannot exert their influence on the ecosystems of the national park and on its wild ungulates in particular. It must be noted, however, that most of the proposed wilderness area would be hardly suitable for them, mainly through a lack of food. The huge expanses of almost barren rock, snowfields and glaciers that cover much of the area do not offer much to live on anyway. Of course, these habitats harbour Chamois and Ibex in fair numbers – but the steepness and ruggedness of the terrain provides such excellent refuges for swift climbing ungulates that they would largely remain out of reach for the mammalian predators, even if these were present. Wolves recolonizing Glacier National Park in Montana avoided steep and rugged terrain almost totally (Ream

et al. 1993). In their almost predator-free high altitude ranges, populations of Ibex and Chamois are controlled by harsh weather, avalanches and disease. Thus, in the proposed wilderness area, the impact of large carnivores is currently missed only in the lowest portions of the area, around the tree line and in the grasslands above it. In these parts, the current distribution and grazing impact of Chamois, Red Deer and Roe Deer *(Capreolus capreolus)* will certainly change a lot, a soon as the three predators are back. But as such areas cover only a small proportion of the proposed wilderness area, the actual absence of Wolf, Bear and Lynx may be considered of minor relevance to the wilderness character of the area. By contrast, the most important top-predator of the alpine zone, the Golden Eagle *(Aquila chrysaetos)* is present in good numbers. The wilderness area serves mainly as a hunting range for nearby territory holders – the nesting sites being traditionally located at lower elevations, to facilitate downward transport of heavy prey (Winding & Lindner s.d.).

The Hohe Tauern are one of the few areas in Central Europe where almost the full array of avian scavengers is still (or again) present. The area is famous for its summering population of Griffon Vultures *(Gyps fulvus)* and it is one of the prime reintroduction sites of the Bearded Vulture *(Gypaetus barbatus)* (Lindner et al. 2008, for details see section 4.14). Recently, three pairs of Bearded Vulture have established breeding territories in various parts of Hohe Tauern national park. Although the proposed wilderness area lies not within the core home range of the vultures, they visit it occasionally in search for carcasses of wild ungulates, of which there is an ample supply through avalanches and harsh winter weather. Ravens *(Corvus corax)* are present almost year-round.

With glaciers receding (Fig. 17), large tracts of truly virgin land are uncovered each year and dramatic processes of primary plant succession can be observed on the newly exposed surfaces (Fig. 18). Of course, the current recession of glaciers is due to anthropogenic climate change, but the resulting shift of vegetation zones is a natural process that has occurred several times during the Holocene. In the wilderness area, this process could now operate without any human intervention. The same is true for the advance of the tree line. Although most of the outer borders of the wilderness area is currently well above the tree line, release from grazing pressure and the warming climate will probably enable Stone Pines *(Pinus cembra)* and Larches *(Larix decidua)* to move into the lowest parts of the area within the coming decades. The specific features that characterise this process, like the mutualistic interactions of Stone Pines and Nutcrackers *(Nucifraga caryocatactes)* will then be observable in an undisturbed setting.

To conclude, almost the full set of natural processes typical for this type of landscape currently occurs on 100% of the proposed wilderness area, as required by the criteria of Wild Europe.

Fig.17. Virgin land exposed by receding glaciers

Fig.18. Early stages of plant succession after glacier retreat

4.4 SETTLEMENTS

In the proposed delimitation, there are no settlements or buildings within the wilderness area. Originally, the national park considered to include the two alpine huts Kürsinger Hütte (Fig. 19) and Warnsdorfer Hütte (Fig. 20) with their supply infrastructure into the area, but as this would not comply to the Wild Europe criteria, it was decided to revise the delimitation accordingly. Both huts and their supply infrastructure are now located outside of the proposed wilderness area, but still close to its borders.

Of course, a removal of the huts could also be considered. But after closer inspection of the matter, it must be said that **a removal of the huts seems neither feasible nor sensible**. Both refuges have a very long tradition reaching back into the 19th century (Table 2). They are operated by local chapters of the Austrian Alpine Club and are deeply rooted in the clubs history and life. Active members invest a lot of money and a considerable amount of voluntary and professional work-time in the maintenance, operation and development of the huts. It is very unlikely that the club members would agree to the removal of the buildings and any such proposal would probably cost their much-needed support for the wilderness plans. Also, the operation of the two huts secures 6 permanent and 5 seasonal jobs (Table 2). Last, but not least, the huts play an essential role for the alpinism in the area. They are located at strategic points along major hiking routes, among them the routes leading to one of the most prestigious peaks in the Austrian Alps, the Großvenediger (3,660 m). It must be emphasised that despite their relatively high visitor numbers (Table 2), the huts are by no means installations intended or suited for mass tourism. They certainly make access to the area easier, but it must be kept in mind that this is a rather hostile and potentially even dangerous area, which is only accessible to experienced and well-equipped hikers and alpinists anyway. Removing the huts would dramatically reduce the number of visitors to the area, leaving only a very small group of people that could continue to venture into it. Also, and more gravely, the people that would be excluded – enthusiastic mountain hikers and alpinists – represent a segment of the Austrian society that is potentially most supportive to wilderness ideas. This relatively large group will play an essential role in the public acceptance of wilderness areas in Austria in general. Their support will also be direly needed when it comes to promote and enforce the restrictions and rules of any wilderness area. Many protected area managers have reported on the fact that the most efficient visitor management comes from motivated visitors themselves: well-informed and supportive visitors educate and guide other visitors in their actions. Austrian hikers and alpinists have certainly still a lot to learn about wilderness. Excluding these potential wilderness supporters from a spectacular, newly-set up area would create an atmosphere of hostility, in which no room would be left for learning about wilderness management and correct wilderness behaviour. Therefore, it seems highly advisable to maintain the huts and to adapt the zonation of the wilderness area accordingly.

Table 4. Technical data of the two huts in the Transition zone

Hut	Owner	Year of construction/ renovation	Altitude (m a.s.l.)	Buildings
Kürsinger Hütte	ÖAV Salzburg	**1842** precursor of the present hut (location a few dozen meters downhill) **1885/86** construction of present hut **1980/83** renovation	2.558 m	Main building 540 m², height 9 m Winter hut, height 4,5m Machine hut cable car, upper station: height 4m, Machine hut cable car, valley station: 135 m², height 5,82 m Old machine hut, height 3m Hut for wastewater treatment, 55 m², including 3 reservoirs and a grease separator below ground Helicopter landing place 100 m²
Warnsdorfer Hütte	ÖAV Warnsdorf/ Krimml	**1897** construction of present hut, renovation in **1991/92** enlarged in **2012**	2.336 m	Main building 81 m² machine hut cable car: 12 m² pigsty 12 m² Underground sewage treatment plant 20 m² Helicopter landing place 30 m²

Table 5. (continued)

Hut	Beds in individual rooms	Beds in dormitory	Beds in winter room	Facilities	Open (with staff present)
Kürsinger Hütte	50	100	16	Showers, seminar facilities, indoor climbing wall	1th of March to 30th of September (in winter, only winter room accessible)
Warnsdorfer Hütte	13	61	14	Showers, seminar facilities, special quality label „Genießerhütte“, Environmental Certificate	1th of June to 30th of September

Table 6. (continued)

Hut	Number of peple staying overnight/ season	Day time visitors	Staff	Energy supply
Kürsinger Hütte	Summer: 2.860 Winter: 2.490	500	permanent: 3 seasonal: 3	Small hydropower plant, maximum power 400 KW, average 150 KW; Pelton wheel 100 l/sec., penstock length: 700 m, head: 170 m Underground cable: 1500m, Overhead power line: 2000m
Warnsdorfer Hütte	Summer: 2.100 Winter: 50	Summer: 800 Winter: 0	permanent: 3 seasonal: 2	Small hydropower plant 44 kW (hut 22 KW), Pelton-wheel 50 l/sec, penstock length 272 m, head: 110 m, underground cable: 550m

Table 7. (continued)

Hut	Cable car	Water supply	Wastewater treatment	Waste management
Kürsinger Hütte	Maximum carrying load 500 kg, length 2 km, 4 Pylons, height 6 -12 m; average height of cable above ground 8 m (maximum 70 m)	Water supply from local source and melting water, storage within two resevoirs: 300 l and 10.000 l	4 chamber biological sewage treatment plant	Waste separation (paper & cardboard, plastic, organic waste and residual waste); transported to next village for definitive disposal
Warnsdorfer Hütte	Maximum carrying load 160 kg, length 1,8 km, 4 pylons, height 4-5 m; average height of cable 10 m above ground (maximum 45 m)	Water supply from local source, reservoir capacity 9 m³	Biological sewage treatment plant, 95% purification, re-sidues transported to next village for definitive disposal	Waste separation (paper & cardboard, plastic, organic waste and residual waste); transported to next village for definitive disposal

Fig.19. Kürsinger Hütte

Fig.20. Warnsdorfer Hütte

Still, even if the **huts are located outside the wilderness area, their impact on the wilderness atmosphere of the landscape must be discussed.** Both huts are traditional alpine huts, built in locations with rather difficult access and not much room to expand (Table 2). Kürsinger Hütte is a relatively large building, consisting of 3 compact and interconnected units, with three storeys each. In the immediate vicinity there are 3 smaller, one-storeyed side buildings harbouring supply facilities. Warnsdorfer Hütte is a single, two-storeyed building with a small additional side building for the cable car. Both huts have foundations built of the local grey stone. With exception of the foundations, the huts are covered with shingles of dark reddish brown larch wood, the weathered parts becoming progressively grey. The roofs of Kürsinger Hütte are covered with grey tiles, the roof of Warnsdorfer Hütte is of sheet metal painted greyish brown. The window shutters of Kürsinger Hütte are the only conspicuous features, being painted in red and white, according to a tradition in huts of the Austrian Alpine Club. From a distance, the dominating colours of stone, wood and the drab roof materials quickly merge with the surrounding rocky landscape (Fig. 21). Unobtrusiveness, use of local building materials and reference to regional building traditions are guiding principles for all huts of the Austrian Alpine Club, Kürsinger and Warnsdorfer Hütte are no exception to this. Due to terrain morphology, both huts disappear from sight, as soon as one has moved a few hundred meters away from them (Fig. 22). Of course they might be spotted from peaks and vantage points, but in the very rugged and wild landscape one really has to search for their location. **Thus the visual impact of the huts on wilderness atmosphere is rather low and localised.**

The **supply facilities are another issue with respect to visibility values.** Both huts have a small **cable car for material transport**, which connects the hut to the endpoint of a driveable road on the valley floor (2 km away from the hut and 630 m below it, in the case of Kürsinger Hütte, 1,8 km away and 515 below in the case of Warnsdorfer Hütte, Table 2). Both at the start and at the end of each cable car line, there is a building containing the machinery for its operation. The 4 pylons of the cable cars are of moderate height (6-12 m in the case of Kürsinger Hütte, 4-5 m in Warnsdorfer Hütte), their colour is mostly unobtrusive, although single pylons are painted in red and white to improve their visibility to helicopter pilots on rescue flights (Fig. 23). On average, the cable runs very close to the ground (8-10 m) only in in a few places, the distance above ground reaches 45 and 70 m. For people hiking on the main path to the hut, the row of pylons is of course visible, but not very much in evidence as it mostly runs at some distance from the path, often disappearing behind rocks, cliffs and other features of the terrain. From a greater distance, the pylons and the cable are hardly visible, again due to the overall ruggedness of the landscape (Fig. 24). The cable cars are essential for the maintenance and operation of the huts, as most material needed and most of the waste produced has to be transported with the cable car, either up to, or down from the huts (Fig. 25).

Fig.21. Kürsinger Hütte merges into the surrounding landscape

Fig.22. A few dozen meters further uphill, Kürsinger Hütte disappears from sight

Fig.23. Cable car pylons and power line near Kürsinger Hütte

Fig.24. Cable car near Warnsdorfer Hütte – spot the pylons!

Fig.25. Cable car crossing trail to Warnsdorfer Hütte

Fig.26. Helicopter landing place near Warnsdorfer Hütte

There is no driveable road to the huts, which can only be reached on narrow hiking paths. The only alternative for cable car transport would be frequent helicopter flights, but this would undermine the national parks general rules and policies concerning aircraft. Within the national park, the use of low flying aircraft is generally restricted to rescue operations and to absolutely necessary supply flights with very heavy loads, which cannot be transported by cable-car, or otherwise. The latter flights need a special permit and are restricted by the national park to a minimum. In the case of Warnsdorfer Hütte, no flights are normally necessary for the operation of the hut, flights are only undertaken when there is a need to transport heavy material, either for trail maintenance or for building activities within the hut, which happens rarely (Fig. 26). In contrast to this, Kürsinger Hütte needs regular helicopter supply, despite its cable car. This is mainly due to the fact that the hut is open from late winter/early spring onwards, when the access road to the cable car is still impracticable for months because of deep snow cover and avalanches. To minimize acoustic impact, flights are concentrated in a single bout in the first days of March. On this occasion, the helicopter has to commute up to 12 times between the hut and the Salzach valley, transporting supplies needed during the times of road closure and removing heavy waste that has been collected in the course of an entire year. Outside this short, but certainly intensive spell of flights, helicopter use around Kürsinger Hütte is limited to instances where trail maintenance needs heavy gear, which is not often the case. **From a wilderness point of view, this is not an ideal situation, but we can see no alternative. Still, we would recommend to take special care that flights to Kürsinger Hütte are really kept to a minimum. If possible, ways should be sought to further reduce the number of flights.**

In any case, without the cable cars, much more frequent flights would be necessary. As cable cars for material transport make practically no noise, the national park administration is keen to have them installed in all isolated huts across the park. This is important, as supplying huts by helicopter has become a widespread practice in the Alps outside of protected areas. The moderate visual impact of cable cars is seen as a comparatively minor problem. In the new delimitation of the wilderness area, the two cable cars are located outside the core area, in the transition zone. **As a linear structure of limited dimensions, their impact on the nearby wilderness area is only of local importance.**

In the case of Kürsinger Hütte there is also a **5 KV power** line, with wooden pylons running in parallel to the cable car. The power line comes from a small hydropower plant on the valley bottom that supplies the hut with electricity, it has a total above ground length of 2 km (another 1,5 km of cable running underground, Table 2).It is less conspicuous than the nearby cable car and adds only little to the visual impact of the latter, but a certain impact cannot be denied. At the moment, there seems to be no perspective for a removal of the power line, for example by installing photovoltaic panels on the roofs of Kürsinger Hütte as an alternative to hydropower electricity. The performance of the available solar panels is said to be too low with respect to the hut´s energy demands and the local duration of sun-shine hours. Still, technological improvements and the implementation of a modern energy-saving concept for the hut might pave the way to a later removal of the power line.

To Warnsdorfer Hütte, electricity is also supplied by a small hydropower plant, located two hundred meters below the hut (Table 2) This installation is almost invisible as it consists of a pipe diverting water from a nearby waterfall and leading it to a little hut built of lichen covered stones, which contains the generator (Fig. 27). This hut is huddled into a ravine and remains unnoticed by most visitors passing close by on the main access path. The cable to the hut runs on or below the ground. So the electricity supply facilities of Warnsdorfer Hütte are of no relevance to visibility values.

Opportunities to reduce the visual impact of buildings and supply infrastructure should be used, whenever they arise. For example in Warnsdorfer Hütte, there are plans to integrate the cable car operation hut into the main building and to reduce the size of the valley station. Such endeavours should be encouraged and supported by the national park administration.

Fig.27. Hydropower plant Warnsdorfer Hütte

4.5 INFRASTRUCTURE

There is **no built infrastructure within the proposed wilderness area,** except for a few summit crosses on major peaks, which are an old tradition in Austrian alpinism and are of no relevance to wilderness visibility values.

Tracks and trails: there are no driveable roads or tracks in the area, but there are a few marked and some unmarked hiking trails and paths. The total length of marked trails within in the proposed wilderness area is 18 km. **Overall, the trail network within the proposed wilderness area is not dense, there are 3 marked trail sections in the Krimmler Achental-part of the area and another 4 in the Obersulzbachtal. In the Habachtal portion there is just one marked trail, while in Untersulzbachtal, the only marked path ends shortly behind the borders of the special protection area, which otherwise has no regular trails** (Fig. 28). The marked trails mostly lead to strategic points, from where on hikers have to find their way on their own. On highly frequented routes, unmarked but very obvious trail sections have developed well behind the last markings.

Trail markings consist of standardized red and white paint blotches on stones and rock (Fig. 29). In some situations, they are combined with (or replaced by) stone piles, providing basic

orientation when colour markings on the ground are snow covered. Only in a few strategic places, like trail heads, passes, major crossroads, etc., yellow sign posts have been installed, which inform hikers about the distance and hiking duration to major peaks, huts and passes along the trail (Fig. 30). These signposts have been standardized all across the Alps. A special colour code provides information on how difficult or dangerous the various trails are, red dots pointing to difficult and black dots to very difficult routes. A special symbol is for trails crossing glaciers and other dangerous terrain. Some of these signposts also carry the precise geographic coordinates of the site (to support orientation with GPS) and a simple numeric code which can be used in emergency situations to inform rescue teams about the location of persons needing help.

Most trails are not broader than 50 cm, allowing only one person at a time to walk on them, groups always having to hike in single file. At very dangerous sites along major marked trails there may be permanently installed steel ropes, or other simple devices like steel cramps and bolts, which provide secure stepping in exposed situations and under difficult circumstances (e.g. crumbling rocks, wet, frozen or otherwise slippery surfaces, etc.) (Fig. 31). There are few such installations, however. On 99.99% of total trail length, hikers have to rely on their own skill and experience.

Fig.28. The special protection area in Untersulzbach valley is largely devoid of trails

Fig.29. Marked trail near Warnsdorfer Hütte.

Fig.30. Sign post at trail head near Warnsdorfer Hütte

Fig.31. Wooden steps on marked trail

Fig.32. Plant communities on wet soils are especially sensitive to trampling

Trail maintenance: if trails are to be used, they have to be constantly cared for, as snow-melt, heavy rains, rock-fall, avalanches, etc. almost annually destroy sections of them. Only a few years of non-intervention would render many trails impracticable. The maintenance of trails is done by the Alpine Clubs, local tourism organisations and the national park administration. Alpine Clubs have very skilled and experienced teams of voluntary trail builders, mostly working with simple instruments. Special care is taken by these teams to reduce the impact of trails on the landscape. The Austrian Alpine Club has a highly developed philosophy of minimum intervention-trails and runs extensive programmes for restoring multiple track-trails to single, low impact routes. Therefore, most alpine hiking trails under the care of the Alpine Club are highly practicable and unobtrusive at the same time. If some of the markings may look very obvious in bright sunshine, they are an important security element designed for foggy conditions, snowstorms and other situations with impaired visibility.

The Wild Europe criteria state that **“footpaths should be minimal with no or minimal markings unless necessary for local conservation requirements or public safety”.** The marked trails within the proposed wilderness area correspond to the most frequented sections of otherwise unmarked paths. Although hikers, climbers and skiers have free access to all parts of the national park – for details and temporary restrictions see section 2.6 – the difficult terrain forces visitors onto defined routes, which leads to the development of obvious paths in the most trodden parts. As alpine soils and plant communities are very sensitive to trampling (especially in wet situations, Fig. 32) **it makes sense both from a conservation and a minimum-intervention point of view to concentrate visitor impact on single tracks along this routes. This is best achieved by marking trail sections and by careful maintenance measures.** It must be stressed that the existing network of marked trails is relatively short and insignificant with respect to the total area. It provides basic access, but does not promote excessive visitation.

Removing markings and discontinuing maintenance measures on the most frequented trail sections would either increase visitor impact on sensitive sites or (in the long term) reduce overall accessibility of the area, which cannot be a management goal either (Fig. 33). **We therefore suggest that the present level of trail marking and maintenance (including local security measures in dangerous places) should be sustained, but there should be no new marked trails opened within the wilderness area.** For security reasons, the few existing signposts with security information should remain in place as well.

Fig.33. Difficult hiking terrain (note trail marking in right corner of picture)

Fig.34. Trail crossing dangerous terrain

Concerning marked trails and their maintenance, there is another important point. In recent years, **geomorphological dynamics have strongly increased in the area, as a result of climate change.** Due to the accelerating thaw of permafrost soils, large scale land-slides and rock-falls occur much more frequently than before and some traditional trails have become too dangerous (Fig. 34) or have disappeared altogether. Only a few years ago, a group of hikers has been killed by a huge landslide below Kürsinger Hütte, which has wiped away a trail that had been used safely for decades. Such accidents have forced the national park to close some trails and to open alternative routes instead. The future wilderness regulations must allow for these eventualities: **if an existing, marked trail becomes too dangerous or is altogether destroyed by natural processes, the establishment of a new route must be permissible, to secure basic access to the area.** In any case, trail building, marking and maintenance measures should observe minimum impact rules.

A special trail below the Kürsinger Hütte must be mentioned: a via ferrata leading from the valley floor to the hut, crossing a steep cliff, which towers above a recently formed glacier lake (Fig. 35). **In the revised delimitation of the proposed wilderness area, this trail is located outside the area.** The via ferrata is secured with steel ropes, cramps and bolts and provides a spectacular sight over the valley and an exciting climbing experience to “normal” hikers. The total length of this installation is 500 m. As it follows narrow rock ledges, clefts and ravines, it is hardly visible from a distance and its impact on wilderness atmosphere is minimal. **Still, we recommend that no such installation shall be built within the confines of the wilderness area.**

Close to the border of the wilderness area on the valley floor, one of the marked access trails crosses the river Obersulzbach on a **simple wooden bridge.** This bridge is part of the trail infrastructure and should be maintained, as otherwise the very wild river could not be forded, which would result in an almost total closure of substantial parts of the area.

Near the bridge and still outside of the area, there is a **hydrological gauging station** measuring flow, turbidity and discharge of the river within the framework of a nation-wide hydrological monitoring scheme. Among others, the purpose of this monitoring scheme is to document hydrological changes in glacier-fed rivers due to climate warming. This scheme will be of high relevance for the monitoring of processes affecting the future wilderness area and should be upheld by all means. The instruments are housed in a grey metal box fitted to a large grey boulder. The installation is unobtrusive and of no relevance to wilderness values.

Fig.35. Via ferrata to Kürsinger Hütte, towering above a recently formed glacier lake

Fig.36. Bridge across Obersulzbach river and rescue boat case (centre background)

Further up the trail, at the very border of the wilderness, there is **another bridge** (Fig. 36) providing access to the via ferrata. This bridge crosses the river at its outflow from a large glacier lake that was formed only a few years ago, when the glaciers started to melt at an increasing pace. The lake has cut off former hiking routes crossing the glaciers. It does not figure on older maps and there have been instances of hikers using such old maps, ending up caught between the receding glacier, the lake and the steep and crumbling moraines along its shores. For this reason, **a small rescue boat** has been brought to the only accessible shore of the lake, near the second bridge. This **boat is housed in an unobtrusive box** made of light grey wood. It may be considered as part of the necessary security infrastructure.

Other technical infrastructure (Fig. 37): currently, there is no technical infrastructure in place to secure human life and property against avalanches, landslides, rock-fall etc. As on principle, the national park law would allow for such installations even in national park core-zones, the regulations for the future wilderness area should clearly state that **no technical modifications of the landscape are permissible within the area, not even for protective reasons.** Should any settlement, road or installation in the vicinity of the area need technical protection against the impact of geomorphological processes issuing from the wilderness area, the corresponding installations should be erected **only well outside the area and with special consideration to impacts on visibility values.** Authorities responsible for the authorization of new infrastructure in the vicinity of the wilderness area must be fully aware of the restrictions resulting from considerations of wilderness atmosphere, even in the transition area. **Decisions that would make protective installations a necessity should be avoided as far as possible.** Since substantial portions of the wilderness area are located on steep slopes above the valley floor, any new development there might lead to the need of protective infrastructure further uphill. **Thus locations for new agricultural buildings, access roads etc. must be chosen and authorized with great care. In the regulations for the wilderness transition zone, this should be made explicit.**

Fences: there are no fences within the wilderness area.

To conclude, the proposed area largely conforms to the Wild Europe criteria regarding infrastructure, trails and paths.

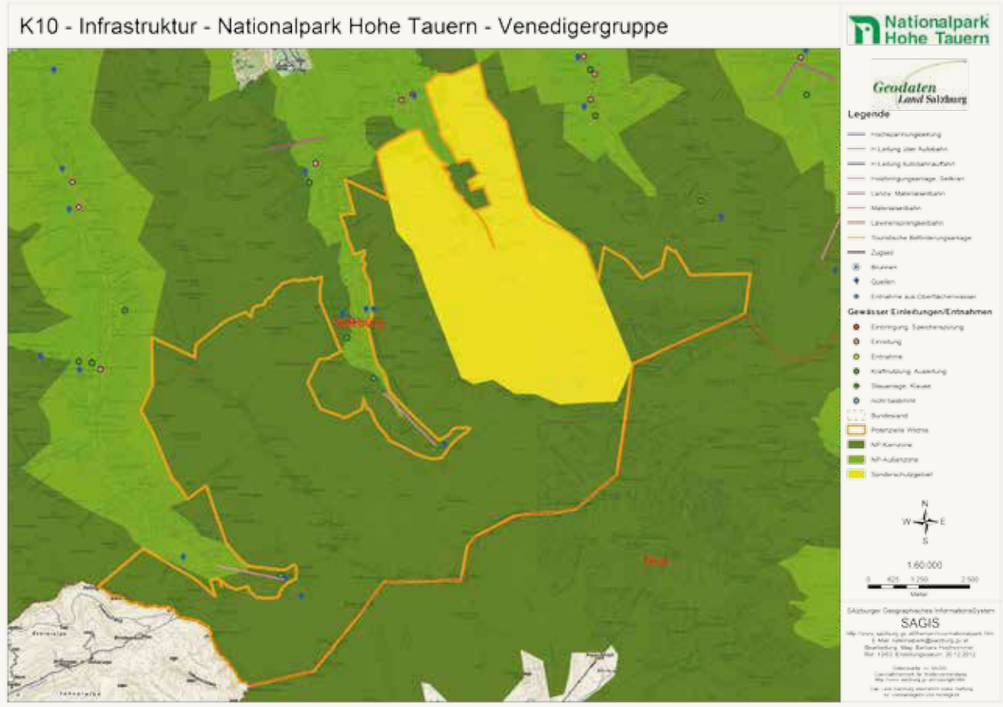

Fig.37. Infrastructure in the vicinity of the proposed wilderness area.
Pink lines: cable cars; blue drops: sources; dots in various colours: minor technical installations for water abstraction/diversion, mostly in connection with the operation of small hydropower plants.

4.6 ACCESS

The existing regulations on access to the national park largely conform to the Wild Europe criteria. The Salzburg national park law states under § 3 that **“the conventional forms of alpinism and hiking, ski touring etc.” are not subject to restrictions within the park, with the exception of special protection areas, where special regulations might be in place. This means that on principle, alpinists and hikers have free access to all zones of the national park. There is no general obligation to stay on marked paths or trails.**

However, **the parks administration should keep up legal options for temporally restricting access to parts of the future wilderness area.**

Such a temporal closure could be necessary for two reasons: First, to secure an undisturbed winter range for large ungulates and second, to provide safe breeding sites for large raptors.

Concerning ungulates, it is important to keep in mind that alpine populations of Red Deer, Chamois and Ibex have special wintering strategies: they move into quiet areas, where a reliable, albeit scarce source of food remains available throughout the cold season. In these areas, they greatly reduce their activity and even their metabolism, to be able to save energy and subsist on a very meagre diet. In the case of Red Deer, recent research has even demonstrated that these large animals perform an internal, “hidden hibernation”, during which metabolism is reduced to a surprisingly low level and the digestive tract undergoes deep modifications, in adaption to the use of low-energy food (dry grass, twigs and bark of trees and shrubs; Arnold 2004). “Hibernating” Red Deer need quiet zones with a favourable microclimate and sufficient cover, where they can avoid any unnecessary movement. When they are disturbed and forced out of these retreats (for example by skiers), their metabolism shifts to the normal summer mode, which leads to strongly increased energy- and food-requirements. In favourable habitats, the deer can satisfy these needs by intensive browsing and peeling of trees, with negative consequences for tree vitality and forest rejuvenation. When there is not enough browse available, a reduced body condition with subsequently reduced reproductive performance is the consequence. In the worst cases, the deer might even starve to death, especially during spells of extreme winter weather. Ibex (Fig. 38) have a comparable, but slightly different wintering strategy: they spend the winter on south facing, very steep and exposed slopes where snow cannot form a continuous, thick cover, because it is either blown away by the wind, slides downhill easily or melts quickly on sunny days. Here the Ibexes subsist on exposed dry plants, maintaining a delicate energy balance through reduced activity, frequent sun-bathing and digestive adaptions. Suitable wintering sites for Ibex are surprisingly rare, the few existing sites being one of the limiting factors for their populations. Disturbing Ibexes on their wintering slopes not only increases starvation risk, but also drives them into deeply snow-covered terrain, where they are likely to be killed by avalanches. The wintering strategy of Chamois is comparable, but they are somewhat less choosy with respect to site quality, concerning exposure and snow cover. Nevertheless, they also need undisturbed places and are highly sensitive to human intrusion.

4. Compliance to the Wild Europe Criteria

For these reasons, setting up so-called **“quiet areas” (“Ruhegebiete”)** is an important wildlife-management tool in the Austrian Alps in general. Cross-country skiers, snow-shoe hikers and other winter tourists are kept out of such areas. Where this cannot be done, ungulate populations either cause severe damage to the forest or suffer from unnatural high mortality, or they become entirely dependent on artificial winter feeding. **In alpine national parks, quiet areas are an essential tool to secure ungulate winter survival and to “keep wild animals wild”. It is absolutely essential that this instrument remains available in the proposed wilderness area. Having vital ungulate populations, exhibiting natural behaviour and their special wintering adaptions must have absolute priority over human visitor interests in the wilderness area.**

Fig.38. Herd of young male Ibexes

Therefore we recommend **that an option for temporal restrictions to human access in winter should be part of the regulations for the proposed wilderness area.** The location of these areas should be based on sound scientific research and a close monitoring of ungulate movements. A high degree of flexibility will be needed to allow for changes in the distribution and behaviour of the animals. In any case, **the rationale behind temporal restrictions should be actively communicated to winter alpinists and hikers.**

Another type of temporal restriction to access might be necessary for the **protection of raptors eyries**, especially those of Golden Eagles, in the long run maybe also for Bearded Vul-

tures. Large raptors have suffered from persecution for centuries and are therefore extremely sensitive to human presence within several hundred meters around their nests. **Nest protection zones** with a radius of 300-500 m, set up during the breeding period, are a very efficient tool to secure undisturbed breeding in large raptors (Bierbaumer & Edelbacher 2010, BirdLife 2012) . As in Hohe Tauern national park, eagles start to breed in February/March and their young fledge in July (Winding & Lindner s.d.), nest protection zones will have to be upheld for at least 5 months. For Golden Eagle-eyries, the shape and diameter of these zones will depend very much on the terrain. In sites where access is difficult and visibility of human intruders is low, nest protection zones might be smaller than proposed above and it might be sufficient to keep climbers away from nesting cliffs. Currently, no eagles nest within the confines of the proposed wilderness area. As already mentioned, Golden Eagles prefer to nest around or below the tree line, while hunting areas are located above the nesting site. Bearded Vulture breeding sites are actually found only in the eastern part of the park and it remains to be seen whether they will spread to the western parts and whether there are suitable sites within the wilderness area. **However, as a management tool, the possibility to set up nest protection zones should be part of the wilderness area regulations.**

The Wild Europe criteria state that there should be **"no wheels and no motorized access for recreational use"** in a wilderness area. As none of the existing trails in the proposed wilderness area is suitable for mountain-bikes or motorized vehicles, **this criterion is easily met.** The use of low-flying aircraft for sportive or recreational purposes (e.g. for helicopter skiing or sightseeing flights) is generally prohibited in Hohe Tauern national park, so visitor access with motorized aircraft is also no issue.

The driveable dirt-roads (one in each of the three valleys), ending near the outer border of the wilderness area, are **largely closed to motorized traffic.** Only the national park administration, local land-owners, farmers, foresters, hunters and the staff of touristic huts may use motorized vehicles on these roads. In the very long Obersulzbach- and Krimmler Achen-valley there is a service of **small shuttle buses,** bringing hikers to trail heads. These buses have a special license and their access to the valley is limited to the morning and evening hours, to avoid conflicts with other hikers walking on the road during the day. Some visitors cover the long distances to hiking trail heads with mountain bikes. **Outside the main road there a no routes suitable for mountain bikes.** There is one potential conflict zone with mountain bikers, however. At the south-westernmost tip of the wilderness area, a marked footpath climbs to the Birnlucken-pass, which connects the Krimmler Achental with the Ahrntal/Valle Aurinia. On the Italian side of the pass, the trail is manageable with bikes, while on the Austrian side, it is not. It happens that bikers use the pass nevertheless, by carrying their bikes on the back all along the Austrian section of the trail, until they have reached the driveable section on the Italian side, or the dirt road on the Austrian valley floor. As this happens not too often and only at the very periphery of the wilderness area, there is no need for immediate action. But the national park administration should monitor the situation closely and make sure that no more intensive use by bikers develops on that trail section. **Proposals to make the trail fully practicable to mountain bikes should clearly be rejected.**

Access with horses: in some parts of Hohe Tauern national park, touristic operators offer long-distance hiking tours with traditional pack-horses. The proposed wilderness area is not located on one their routes, as its terrain is largely impracticable for horses.

Dogs have to be kept on leads in the national park anyway.

4.7 COLLECTING BERRIES, NUTS, MUSHROOM ETC.

Collecting of berries, nuts and mushroom **is not an issue** within the proposed wilderness area, not even for personal visitor use.

4.8 LIVESTOCK GRAZING

There is **no more livestock grazing** within the proposed wilderness area. At its western-most periphery, near Warnsdorfer Hütte, there are still grazing-rights on 502 hectares of land that have not yet been compensated (active grazing has stopped there some years ago for economic reasons). As already mentioned, this area will be excluded from the wilderness core and be declared a buffer zone, while striving for a contractual arrangement.

4.9 FORESTRY

As there is hardly any forest within the proposed wilderness area and all land-use has already been discontinued after compensation of the land-owners, **extractive forestry is not an issue.**

Still, the Austrian forestry law also applies to unused forests, **prescribing interventions in the case of bark-beetle outbreaks, large scale break-down of forest cover, apparent lack of rejuvenation and for the maintenance of protective forests.** Exemptions from these obligations are only possible in forests declared as **"biotope-protection forests" (Biotopschutzwälder) under § 32a of the Austrian forestry law.** This status may be granted by the regional forestry authorities on request of the land owner/land manager.

We strongly recommend that the national park should apply for such a status with respect to the wilderness area, even if at the moment, there is not much forested land within it. But forests might advance into the area in the future, due to climate change, as

a consequence from the release of grazing pressure by livestock and as a result of the still ongoing recovery of forests from historical overuse. With increasing forest cover, the likelihood of natural disturbances affecting the stands will increase as well. Since the above mentioned **forestry measures are not at all compatible with a wilderness area, it would seem wise to secure a total non-intervention management regime right from the outset.**

4.10 DEAD WOOD COLLECTION

This is not an issue in the area.

4.11 HUNTING, FISHING AND GAME MANAGEMENT

As the proposed wilderness is located on land declared as strict national park core zone/special protection area, where contractual arrangements secure the permanent discontinuation of hunting, **conventional hunting is no longer an issue in the area.** Still, most game populations have home ranges reaching far beyond the confines of the wilderness area and even of the national park. Therefore, it is essential to have a closer look at the game management policies of the park. These reflect a state of transition between the high standards for game management in national parks that have recently been set by the joint roof organisation of Austrian national parks (Nationalparks Austria 2011) and the traditional wildlife management practices in the region.

The guiding principles for ungulate management in Austrian national parks state that such a management ***can*** be necessary if

- the grazing/browsing impact of wild ungulates threatens the natural vegetation on a major proportion of the protected area (either by suppressing the natural development and regeneration of forest communities, by reducing species diversity or by impairing protective functions of forests)
- ungulate activity has serious negative impacts on land surrounding the national park (inacceptable level of damage to forestry and agriculture)
- populations of non-native ungulates are present in the park

Thus, **interventions in ungulate populations are by no means compulsory.** Where regulation by natural processes (disease, harsh weather, predators) is sufficient, no interventions will be necessary.

The guiding principles further specify that any ungulate management must happen **outside the intervention-free core zones of national parks** or even outside the park. Management measures should be restricted to the **absolute necessary minimum**, should **avoid unnecessary disturbances** and **take into account species-specific needs and the action of natural processes.** Measures for population regulation and control should happen in intervals only, short intervention episodes alternating with much longer non-intervention periods. Another approach is to **focus interventions on certain areas** ("Schwerpunktbejagungsgebiete"). The necessary infrastructure for regulatory measures has to be kept to a minimum and should be removed when no longer needed. **Culling of ungulates must be done by skilled and qualified park staff.** No licenses for the participation in culling operations are sold to external hunters. Antlers and horns become property of the national park and may be used for scientific and educational purposes. **Culling focusses on young animals and females, there is no shooting of trophy-carrying old males.** Only **lead-free ammunition is to be used.**

The park management has to make sure that ungulates **can move freely across the entire park during the whole year** (no enclosures during winter). Natural regulating mechanisms like **harsh weather, avalanches, floods etc. are to be taken into account when designing and implementing game management measures.** Likewise, **diseases and parasites** are considered **as natural factors,** contributing to the regulation of ungulate populations. Interventions are only permissible when prescribed by regional authorities under special circumstances (epizootics, unbearable economic damage, threats to human health). It must be stressed that according to Nationalparks Austria, such interventions **can temporally also be extended to national park core zones.**

The park management is expected **to document all game management activities.** It has to perform a **vegetation monitoring and ungulate population monitoring,** the latter also in the vicinity of the park. Game management has to be continuously adapted to monitoring and research results.

Close **co-operation with neighbouring hunting territories and coordinated game management on a regional scale are highly recommended.** The national park should actively **seek contact** with and **provide information** to neighbouring hunters, game management associations and other stakeholders in this field.

On a supraregional level, the national parks should **support the restoration of large and medium-sized carnivores, the protection of rare species like grouse and the establishment of wildlife corridors.**

In practice, some Austrian national parks still have difficulties to meet the above outlined standards. There is a number of **exemptions that can be granted on a temporal and local basis.** These exemptions concern:

- **Culling interventions in strict core zone areas:** if population regulation outside the core zone is not feasible at the moment, culling can be performed on a very limited number of days even within the core zones.

- **Interventions in forest restoration areas:** interventions according to a clear plan may be permissible, where population levels of ungulates have to be kept temporally at very low levels, to facilitate restoration of a natural forest composition,
- **Winter feeding:** The traditional winter ranges of Red Deer on low-lying valley floors have often been lost to human infrastructure and settlement development. Additionally, former migration routes between summer and winter ranges have been interrupted. The restoration of migration routes and natural wintering areas for Red Deer is a long term goal for all national parks. But as long as this is not achieved, a certain level of winter feeding is permissible, albeit only to an extent that matches the carrying capacity of the summer range and only with appropriate fodder (rough browse of excellent quality)
- **Participation of local hunters in culling activities:** permissible if qualified national park staff is not available in sufficient numbers.

In the Salzburg part of Hohe Tauern national park, game management largely complies to the above mentioned guidelines in all hunting areas, which have been leased by the parks administration directly. This is the case in all non-intervention core zones of the park and thus also in the proposed wilderness area.

If necessary at all, **regulation of ungulate numbers is done outside the strict core zone.** There are **no winter feeding stations within the core zones and only a few within the external zones.** In one instance in Habachtal, a feeding station that was originally located outside the national park has been moved into the external zone. The rationale behind this unusual step was to reduce late winter conflicts between deer and farmers. These occurred annually after winter feeding had ceased on the valley floor and deer were still prevented to migrate to higher elevations by deep snow in the cold valley entrances and had to move to the farmers meadows instead. By relocating the feeding station to higher ground, the deer had access to sunny slopes becoming snow free at a much earlier date, thus avoiding the necessity to migrate across snow-choked valley entrances. This comes comparatively close to the natural situation, where parts of the deer population used to winter further uphill in favourable sites with an early thaw. This example illustrates the very conscious management of ungulates by the national park. Of course, **conventional hunting management prevails outside core zones and around the park.** But the national park has been granted a **special status by the provincial hunting law, and has to be consulted in major issues on hunting management** (§ 58, 60,149 and 155 Jagdgesetz Salzburg, Salzburger Landesregierung 1993). Therefore, the park administration has some influence on game management far beyond its boundaries. Also, Salzburg is one of the Austrian provinces that has implemented the so-called framework for **“Spatial Planning in Wildlife Ecology”(“Wildökologische Raumplanung”, shortly WÖRP”)** which is an essential tool for successful large ungulate management. In this framework, ungulate populations are managed over spatial units much larger than individual hunting territories or even clusters of hunting territories. The national park is an **important player in the regional WÖRP-system.**

Concerning the wilderness area, **we recommend that the game-management guiding principles of Nationalparks Austria should be upheld within the area** and – if possible – **be extended to adjoining hunting territories,** whenever this makes sense,

e.g. regarding the use of lead free-amunition. However, **in some points we would advocate a stricter approach for the wilderness core** than in the national park guiding principles. In our view, there should be **no exemptions for interventions in the wilderness core zone at all:** neither for practical reasons, nor in the case of diseases and epizootics (see also section 4.18), nor for the sake of forest restoration. If necessary, **regulatory measures should be performed exclusively in the wilderness transition zone, or outside the protected area altogether.**

We would also strongly emphasize the **need for restoring natural processes and phenomena,** as for example the migration of Red Deer between winter and summer ranges, or the former local wintering traditions of Red Deer above the tree line. To this end, the park administration should **prepare a scientifically sound road map for such restoration activities, including a detailed and well-founded plan for the gradual phasing out of winter-feeding stations.** Also, we would welcome a much more active role of the park in the restoration of large carnivore populations.

Fishing is not an issue within the proposed wilderness area, as the relevant, uppermost river stretches are not suitable for harvestable fish populations. This is due to high flow velocity, low temperature, strong turbidity and the occurrence of natural barriers like waterfalls etc.. Still, river sections below the wilderness area (within the national parks external zones and beyond) have harvestable fish stocks, managed by one local family with the exclusive fishing license in the case of Krimmler Ache and Obersulzbach. Neither species composition nor stocking practices in these river sections conform to strict national park core zone rules, nor to wilderness criteria. Stock management relies very much on exotic species like Rainbow Trout *(Oncorhynchus mykiss)* and Brook Trout *(Salvelinus fontinalis)*, along with non- native strains of Brown Trout *(Salmo trutta)*. Like almost everywhere in Austria, stocking practice aims primarily at sustaining high yields for anglers, with not much attention being paid to sustain a natural population structure, to strengthen natural reproduction or to respect stream carrying capacity.

In contrast to this, the **fishing rights in Untersulzbach** (the river originating from the special protection area) **have been leased by the national park on a 9 km long section** between the source and a waterfall at the lower end of the valley. The same has been done on another 5 river sections and on 12 lakes in various parts of the national park. The **leased river section on Untersulzbach represents the longest stretch without conventional fisheries management within the Salzburg national park.**

On this model, we suggest that the national park should also **take a stronger hand in fisheries management in the other two rivers originating from the wilderness area** (Obersulzbach, Krimmler Ache), at least for those river sections below the wilderness area that are isolated by natural barriers from the Salzach river. Even if it it is not possible to lease these river sections in the medium term, the national park should strive to influence fisheries management there, aiming at a total removal of exotic species, a gradual phasing out of artificial restocking and a strong reliance on natural reproduction of native fish stocks. Such an ecological approach is fully compatible with a moderate harvest, as demonstrated on a famous Lower Austrian trout river by the ecological fishing-association “Die Bewirtschafter”. The principles and practices of this association *(http://diebewirtschafter.at/philosophie/mission-statement)*

could be applied to the river sections in question, if some degree of use is to be maintained. If feasible, all three wilderness rivers should also be included in the restoration project for the Danube-strain of the Brown Trout, that is currently implemented in several valleys of Hohe Tauern national park (see 4.14) This will of course depend very much on the degree of isolation of the river stretches, to avoid hybridization of the rare and valuable Danube strain of the Brown Trout with widespread non-native strains.

4.12 CROP AGRICULTURE

This is not an issue in the area.

4.13 RESEARCH AND MONITORING

There are several research and monitoring programmes within the national park. The **research activities focus on key-species and habitats, on landscape level-processes and on relevant management issues.** The following enumeration provides a snapshot on current and recently completed projects within the Salzburg part of the park (Bauch & Urban 2012). Regarding species, there is an on-going **telemetry study on Ibexes**, to elucidate their habitat use and seasonal movement patterns across the park. The m**igrations and movements** of **Griffon Vultures** between Croatia, northern Italy and Hohe Tauern are also studied with the help of satellite telemetry. The reintroduction programme for **Bearded Vultures** is accompanied by an **extensive international monitoring and colour marking programme.** There are regular **censuses** of **Golden Eagle**-breeding pairs and a project to develop comprehensive habitat models for **owl-, woodpecker- and grouse-species** breeding within the park. Recently, a **mapping project for species and habitats of the Fauna Flora Habitat-directive** has been launched, documenting both their distribution and conservation status. There is a field project on the remarkable and highly diverse **lichen-flora** of the national park and an analysis of museum collections of **Harvestmen** *(Opiliones)*, for which the Hohe Tauern range is an Austrian hotspot and endemism-centre. A special **data-bank project** has been set-up to gather all the existent and scattered **biodiversity information on the Hohe Tauern-region.** Within the frame of a three-year study, an ambitious **monitoring scheme for the alpine rivers, lakes and wetlands** of the park is currently being developed. Also, there is a project to devise methods for a **long-term monitoring of major landscape changes** visible on aerial and satellite imagery. In a recently completed project, the **distribution and status of permafrost soils has been mapped** across the entire park, resulting in information of high relevance to climate change-monitoring

and security issues. In a joint project, several protected areas across the Alps have recently **identified major wildlife migration corridors** that must be kept open by spatial planning authorities, if connectivity and gene flow-between wildlife populations are to be maintained. The national park has even conducted a **study on human health issues,** focussing on the **beneficial effects of the Krimmler-waterfalls on diseases of the respiratory tract;** the study helped to identify the best locations from a medical point of view and will form the basis for new visitor access rules to the waterfalls, taking into account conservation needs. In addition to the research activities commissioned by the park itself, there are regional and national activities, like the **hydrological monitoring of glacier-fed rivers** mentioned in section 4.5.

Most of the research and monitoring activities are of **high relevance to the proposed wilderness area.** The national park should thus **keep up the present level of monitoring and research, complementing it with projects that will provide guidance on special wilderness restoration and management issues** (e.g. ungulate impact on vegetation, climate induced changes in vegetation cover and the tree line, etc.).

Currently, all research activities within the park have to be approved by the parks administration, which takes care that they conform to minimum-intervention principles. Within the proposed wilderness area, minimizing both visible and ecological impacts of research and monitoring will be of special importance.

As the wilderness area will provide an invaluable, undisturbed reference area with regard to human impact on alpine landscapes, research and monitoring-results will be of outstanding importance to society and an important argument for setting up the area.

4.14 RESTORATION/REWILDING

There are two ongoing reintroduction projects in Hohe Tauern national park which aim at the **restoration of the original species-spectrum:** a reintroduction programme for the Bearded Vulture and the restoration of the Danube Brown Trout. The reintroduction of Ibex can be considered as an early species restoration programme that has been successfully completed even before the establishment of the park.

The **Bearded Vulture-Programme** is an international species conservation project aiming at the re-establishment of a viable Beaded Vulture population in the Alps (Robin et al. 2003). Due to intensive human persecution, Bearded-Vultures have disappeared as breeding birds from the Alps in the first decades of the 20th century. In 1978, plans for an international reintroduction project were developed, based on an extensive captive-breeding programme and the release of young birds raised without direct contact to humans. The first Bearded Vultures-fledglings were released into the wild in 1986, precisely within the Salzburg part of Hohe Tau-

ern national park. The programme was gradually extended to releasing sites in Switzerland, France and Italy. Since 1986, a total of 189 young birds have been released across the Alps (55 in the three parts of Hohe Tauern national park); the first breeding territories were established from 1995 onwards, the first successful breeding attempt was recorded in 1997, in the French Alps. Since then, the number of mature pairs with territories has increased to 22, which have fledged a total of 93 young across the entire Alps. Although releases began in the Hohe Tauern range, reproduction first started in the Western Alps; only in 2001 did Bearded Vultures start to breed in Austria, again in the Salzburg part of Hohe Tauern national park. But it took them 9 more years to produce the first fledged young. Currently, there are 3 established Bearded Vulture-pairs in Hohe Tauern national park (Izquierdo & Zink 2012), the proposed wilderness area receives regular visits of single birds. But Bearded Vulture presence in the area may soon increase: in 2011, the traditional releasing site in the Salzburg part of the national park had to be shifted from the Rauris-valley (where there is an established pair now) to the Habach-valley. The uppermost portion of this valley lies within the boundaries of the proposed wilderness area.

The national park takes part in an international **restoration project of autochthonous Brown Trout** *(Salmo trutta)* since 2003 (Nationalpark Hohe Tauern 2008, Universität Innsbruck 2012). This project aims at the detection, captive breeding and subsequent release of Brown Trout belonging to the so called **Danube genetic strain.** Recent investigations have revealed that European Brown Trout belong to at least **6 distinct genetic strains.** During the 20th century, **most alpine rivers and lakes have been repeatedly stocked with Brown Trout of the Atlantic strain, while the autochthonous Danube strain became progressively rarer and disappeared from large areas altogether.** At first, it was thought that trout of the Danube strain had only survived in a single Tyrolean lake. But a closer examination of several remote rivers revealed that a number of Danube-populations were still extant, among them some pure lineages. These have been **bred in captivity.** After complete removal of allochthonous Brown Trout and introduced Rainbow and Brook Trout, suitable rivers within Hohe Tauern national park were restocked with captive-bred, autochthonous fish. **An important criterion for the selection of the rivers was the existence of natural barriers such as waterfalls, which prevent the immigration of non-native species and allochthonous Brown Trout strain from further downstream.** Another selection criterion was the possibility to lease fishing rights permanently. Currently, there are 6 rivers within Hohe Tauern national park, where Danube Trout have been successfully reintroduced. None of the rivers is located within the wilderness area. **As already proposed in section 4.11, an extension of the reintroduction programme should be envisaged for the 3 rivers originating within the wilderness area,** even though the uppermost river sections (located within the area proper) are not suitable for fish. Still, **increasing the naturalness of these rivers downstream from the wilderness area will add to its quality.**

A first attempt to reintroduce **Ibexes** to the area was made in 1963, when three males and three females originating from the Swiss national park were released. As this was not successful, there was another attempt in 1977, with 3 males and 6 females being released. The resulting small population remained below a total 20 individuals for almost two decades, due to repeated mange outbreaks. After 1999 however, the population started to increase. **Today it fluctuates around 50 individuals.**

Beyond the above-mentioned reintroduction projects, the national park should earnestly consider the **restoration of former migration routes and wintering range for Red Deer.** As explained in section 4.11, this is not an issue that can be addressed within the confines of the proposed wilderness area. But since some Red Deer summer in the area, it is important to restore the seasonal movement patterns of the species, both for the sake of naturalness and wilderness quality.

On the same grounds, the national park should **support the return of large carnivores** – not so much through active reintroduction measures (which may still be considered for the Lynx in the lower, forested parts of the park), but **mainly through activities raising acceptance among farmers and hunters,** both within and outside the park´s boundaries. This should include the establishment of livestock protection programmes and the adaption of game management practices to the presence of large carnivores. Such measures will help to overcome the main obstacle for the spontaneous return of the species. The national park has been active in this field in the past: after bears had been tracked in the park in 2002, training and information meetings have been held, while in 2009, the national park hosted a ranger meeting of alpine protected areas, devoted to large carnivores. In the same year, a scientific conference on large carnivore management was organized by the Hohe Tauern national park. In the Tyrolean part of the park, a pilot programme for livestock protection (involving guarding dogs and electric fences) has been successfully launched in 2014, after the first wandering wolf had been tracked near the parks borders in 2012. Wolf, Bear and Lynx have repeatedly featured in national park´s children magazine and in other educational material. **We would like to encourage the administration to continue on this successful path.**

Currently there is **no need for other restoration/rewilding measures, as the set of natural processes operating within the wilderness area is almost complete.** Forest restoration is not an issue. Major infrastructure that would need removal is not present. Whether in the long run it will be feasible to restore larger herbivores like Bison and Moose to the National park remains to be seen. Within the present-day confines of the wilderness area it is not an issue.

4.15 TOURISM AND RECREATION

As already mentioned in section 4.6, the area is of high interest to hikers, climbers and ski tourists (see Table 2 for visitor numbers to the huts). Due to the overall steepness of the terrain, canoeing is not possible on the river sections within the wilderness area. As the trails are not accessible to horses, mountain bikes or other vehicles, there is no other travel mode within the area than on foot. Paragliding etc. is not an issue, because the national park does not allow any aerial traffic for sportive purposes – **thus, the Wild Europe criteria concerning the exclusive use of simple, muscle-powered forms of travel within the wilderness area are well met.**

Camping (setting up tents) is not allowed in the national park, but **hikers and climbers may sleep under the open sky or in bivouac sacks,** either when they are forced to do so by special circumstances, or when they undertake a very long climbing tour, which cannot be accomplished in a single day. It is not permitted to light fires, but the use of portable stoves is possible.

We suggest that these regulations be maintained for the wilderness area. Given the relatively small size of the area and the availability of huts near its border, there is no need to set up special camping grounds or to allow deliberate camping within the area.

Visitors to the wilderness area **should be actively informed and educated about "leave no trace rules"** (refer for example to: *http://lnt.org/learn/7-principles*). We suggest that such information should be made available through information boards in the huts, on suitable places along the access routes and through folders and leaflets distributed to national park visitors.

For climbers and hikers on skis, a more specific set of leave no trace rules should be developed, together with the Alpine Clubs and Associations, taking rules for famous climbing sites within American national parks and wilderness areas as a starting point (e.g. Yosemite NP: *http://www.nps.gov/yose/planyourvisit/climbing.htm*). Alpine guides and national park wardens should be trained for the propagation of these rules.

4.16 LANDSCAPE MANAGEMENT

As the proposed wilderness area is embedded in the core zone of the national park, the Wild Europe-requirements concerning **full perception of wilderness atmosphere** are largely met (concerning the visibility of the two huts and their supply infrastructure see section 4.4). Due to the mountainous character of the area and the wide views offered by peaks and elevations, it is of course impossible to fully conform to the Wild Europe rule of thumb, according to which **"from wilderness core zones only core zones and buffer zones should be visible"**. The landscape of the surrounding transition zone is certainly visible in parts of the wilderness area: but views of human activity there mostly consist of low-intensity alpine pastures and some grazing animals, partly also in signs of extensive forestry. Some minor human infrastructure might be visible at a distance, if one searches for it. But **from most parts of the wilderness area, the overall impression is that of an overwhelmingly wild landscape** (Fig. 39-42). Views of intensively used land and of major infrastructure are only possible over very large distances, so that the impact on wilderness atmosphere seems low.

In the future, **the national park should take special care that no visible human infrastructure is installed in the vicinity of the wilderness area – that is on the**

slopes and ridges next to the area, even if national park rules would allow this. Keeping an optical buffer area free of major landscape changes will be of great importance for the maintenance of an undisturbed wilderness impression.

Acoustic intrusion is really minimal. Even around the two huts, the only perceptible sounds are the rush of water, the sounds of the wind and occasional marmot and bird calls. The very rare cars driving on the access road on the valley floor remain inaudible, as their sound is entirely masked by the rush of the fast flowing rivers. Due to the remoteness from large airports, aircraft overflying the wilderness area travel at very high altitudes; condensation trails are a regular sight, but acoustic impact is low. Noise from low-flying aircraft is usually not a problem, as helicopter flights within the national park are limited to emergency cases and unavoidable supply-flights, while other low-flying aircraft are totally banned.

As there is no intensively managed forest within or close to the wilderness area, sounds of chain-saws are not a problem. The use of **motorized machinery** may be necessary during some trail maintenance works, but this is a rare and only localized event.

Fig.39. Séracs on Krimmlerkees

Fig.40. Peaks, glaciers and moraines in the Obersulzbach valley

Fig.41. Natural pond near Kürsinger Hütte

Fig.42. Remoteness and solitude in Untersulzbach valley

4.17 FIRE CONTROL

Under the present-day climate conditions, **fire is not a relevant ecological factor** in the Hohe Tauern range, at least not in its northern sections (where the Salzburg part of the park is located). Lightning-induced, natural fires might occur, but they do not burn larger areas of forest normally (other alpine plant communities have not enough fuel to burn readily). In its current delimitation, the wilderness area has not much forest to burn anyway, so the likelihood for a natural fire seems very low. **Therefore, no special regulations concerning fire management are needed at the moment.** Human caused- fires might be fought as prescribed for forests outside the park, although with special care to keep interventions at a minimum (e.g. no clear-cuts for fire fighting lanes).

With climate warming, fire might become an issue in the long run. Still, the local consequences of climate change might not be automatically conducive to higher fire frequencies in the proposed wilderness area, since on the northern side of the Alps, precipitation is rather expected to increase. With so much uncertainty about future developments, it would be premature to devise rules for fire management.

4.18 DISEASE CONTROL

Diseases are natural processes that affect populations of wild living animals and plants and they are an important part of the evolutionary environment. Therefore there should be no attempts to suppress or control them **in wilderness areas**, according to the Wild Europe criteria.

Still, some diseases are of relevance to human and livestock health, which is why laws and regulations prescribe interventions to control their spread. This is an issue that has certainly to be dealt with, when setting up a wilderness area. In Hohe Tauern national park two wildlife diseases may be of relevance: **rabies** (mainly affecting mammal predators) and **sarcoptic mange** (affecting Chamois and Ibex). Rabies is not really a problem, because it has gone extinct in Austria after large scale immunisation campaigns. Resurgence of the disease is considered unlikely, especially for areas deep within the Alps and far away from regions in northern and eastern Europe, where rabies still occurs. **If some day, immunisation campaigns have to be resumed, they should not take place within the core of the wilderness area**.

Sarcoptic mange is a disease caused by the mite *Sarcoptes rupicaprae* and results in high levels of mortality in Chamois and Ibex. In fact, mange is one of the **major controlling factors for the populations of these mountain ungulates.** Outbreaks of sarcoptic mange occur in 7 to 15 years intervals; they are of great concern to hunters, as they can substantially reduce ungulate populations, which may lead to greatly impaired hunting opportunities and to considerable economic losses. Therefore hunters are traditionally keen to remove affected individuals as quickly as possible from the population. Existing laws and regulations support them in this endeavour. However, this approach is not undisputed among wildlife veterinarians. While in former times the scientific opinion was much in favour of radical interventions, many specialists now argue for a **combination of targeted interventions and the creation of large undisturbed areas, where mange-affected herds remain totally unmolested, to prevent a further spread of the disease through animals fleeing from culling attempts** (Schaschl 2008). Some scientists (Rossi & Meneguz, cited in Molinari 2008) go even further. They argue that almost no level of intervention – barring a total extermination of local Chamois populations – can stop a wave of sarcoptic mange. According to their findings, it is not possible to lower the density of Chamois to an extent that would prevent the disease from spreading (which has been the main argument for the advocates of culling operations). Intervening in herds with affected individuals not only promotes emigration and a further spread of mange, but also raises stress levels among remaining, healthy individuals, thus increasing their liability to an infection. More importantly, Rossi and Meneguz have demonstrated that in mange-affected populations, there are always some individuals partly or totally resistant to the disease. **Shooting all individuals with signs of mange would possibly remove the semi-resistant genotypes from the population and perpetuate the still imperfect mutual adaption of parasite and host. Therefore Rossi and Meneguz argue for a strict non-intervention approach in cases of mange outbreaks, while making sure that not only hunting is suspended in affected areas, but also all other disturbances are avoided.**

Whichever position may be right – having a large undisturbed non-intervention zone, like the wilderness area, does not seem to be of disadvantage for a sensible sarcoptic mange-management. Whether affected individuals leaving such an area should be shot (as recommended by some specialists) or whether a large scale non-intervention approach should be followed, is still open to debate. **For the wilderness area, it will be essential to make sure that a full non-intervention approach is accepted both by veterinarian authorities and the surrounding hunters, as part of a declared and broadly agreed management concept.** If no such consensus is reached, it is very likely that the national park administration will be blamed for maintaining a constant source of mange infection, to the detriment of nearby hunting areas – even if this does not fit with the pattern of mange-epizootics at all. To secure the credibility of a non-intervention management concept, it must be possible to exclude human visitors temporally from Chamois and Ibex winter ranges, especially during mange outbreaks. This again highlights the necessity of **"quiet zones" as an optional wildlife management tool within the wilderness area** (compare section 4.6). A possible model for **mange management in the wilderness area could be the establishment of an intervention free zone that corresponds to the wilderness core zone, surrounded by a flexible management area in the transition zone, where affected Chamois and ibex can be culled, if this is necessary. To provide an official status to such arrangements, they should be incorporated into the "Spatial Planning in Wildlife Ecology"(WÖRP)-framework.**

The Wild Europe criteria also mention **bark-beetle outbreaks** under "disease control". Since currently there is almost no forest in the wilderness area and since its harsh climate would suppress major outbreaks anyway, **no special regulation on bark beetles must be devised at the moment.** As with forest fires, the future development remains uncertain: due to a warming climate, forests might move into the area and bark-beetles could continue their recent advance into altitudinal zones, where they have played no role before. Still, it would be premature to design far-reaching regulations on these mere possibilities.

4.19 ALIEN SPECIES CONTROL

Invasive alien species are not a major problem in high altitude regions of Austria, at least for the moment. Most aliens concentrate in the lowlands, the harsh mountain environments being obviously resistant to invasions by generalist organisms (Essl & Rabitsch 2002). For the Hohe Tauern there are only two aquatic organism (both of northern American origin) to be mentioned: the Rainbow Trout *(Oncorhynchus mykiss)* and the Brook Trout *(Salvelinus fontinalis)*. Management of these species has already been treated under section 4.11: **should the three rivers issuing from the wilderness area have efficient natural migration barriers at the lower end of their course, a total removal of these exotics should be attempted.**

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II. EUROPEAN WILDERNESS SOCIETY

The European Wilderness Society is a Pan-European, wilderness and environmental advocacy organisation whose mission is to identify, designate, manage and promote European wilderness.

Wilderness areas represent a vital part of Europe's natural and cultural heritage. In addition to their intrinsic value, they offer the opportunity for people to experience the spiritual quality of nature in the widest experiential sense – beyond mere physical and visual attributes, and in particular its psychological impact. They also provide important economic, social and environmental benefits, including ecosystem services, for local communities, landholders and society at large.

Wilderness areas perform several functions better than modified landscapes. Among these are for example:

- Conserving biodiversity through natural processes
- Protecting and providing essential ecosystem services such as flood protection
- Connecting landscapes
- Capturing and storing carbon dioxide
- Building knowledge and understanding of natural processes
- Improving social well-being and human health
- Inspiring people

One of the main reasons for the absence of a coordinated strategy on wilderness and large natural habitat areas in Europe is the lack of a common wilderness standard.There are many different words for 'wilderness' and 'wild' and it is impossible to adequately identify, promote, protect, restore an area if its qualities remain unclear, or are understood differently according to geographic location, individual perception or local culture. It is important that any standard can thus be applied in operational circumstances.

The objective of the European Wilderness Quality Standard and Audit System is a widely accepted and applicable wilderness standard definition, that serves as a basis for effective wilderness protection, designation, restoration, and promotion initiatives across a range of geographic and cultural circumstances in all European countries. It provides an easily understood, unambiguous and attractive wilderness standard that can mobilize the necessary interest and support among practitioners and across key sectors of society.

The European Wilderness Quality Standard and Audit System provides wilderness areas with:

- **Improved compliance safety and reliability**
- **Improved effectiveness**
- **Support from government policies and legislation**
- **Interoperability**
- **More Research**
- **Improved marketing possibilities**
- **Reduced costs**

WILDERNESS CATEGORIES AND THEIR MINIMUM SIZE

Four categories of wilderness core zones are defined within the **European Wilderness Quality Standard and Audit System.** Each category defines a specific wilderness quality standard with a clear focus on its wilderness values. Minimum size is ideally governed by multiple considerations including type of habitat that needs to be considered collectively in determining the respective adherence to the criteria. In general the wilderness areas should have a wilderness core zone with the below mentioned size.

- **Bronze Wilderness Area** – wilderness core zone of at least 500 ha depending on the habitat type
- **Silver Wilderness Area** – wilderness core zone of at least 2.000 ha.
- **Gold Wilderness Area** – wilderness core zone of at least 3.000 ha. This category represents the minimum size recommended by the former “Working Definition of European Wilderness and Wild Areas”.
- **Platinum Wilderness Area** – wilderness core zone of at least 10.000 ha. This category represents the highest achievable level in the wilderness continuum.

The areas, which undergo the quality audit process, will become part of the European Wilderness Preservation System.

RECOMMENDATION

According to this WWF report, to which we contributed, we recommend that the Hohe Tauern National Park Salzburg undertakes a complete Wilderness Audit. The preliminary data suggests that the proposed Wilderness Area will comply with the **Silver Standard of the European Wilderness Quality Standard and Audit System.** It is even possible that it will meet the ambitious Gold Standard if some of the listed remaining challenges are positively resolved. The Hohe Tauern National Park Salzburg would become part of the European Wilderness Preservation System and would be invited to participate in the upcoming Pan European Green Corridor Network initiative. The **European Wilderness Quality Standard and Audit System** certification would also clearly document the exceptionally value of the wilderness quality of the proposed area for scientists, researchers, visitors and other interested parties.

EMPFEHLUNG

Die European Wilderness Society empfiehlt auf Basis des vorliegenden WWF Berichts dem Nationalpark Hohe Tauern Salzburg sich gemäß dem **European Wilderness Quality Standard and Audit System** überprüfen zu lassen. Es kann mit sehr hoher Wahrscheinlichkeit davon ausgegangen werden, dass das vorgeschlagene Wildnisgebiet die Kriterien der Silber- eventuell sogar des Gold Standard des **European Wilderness Quality Standard and Audit System** erfüllen wird. Der Nationalpark Hohe Tauern Salzburg würde dann Mitglied des European Wilderness Preservation System und würde zur Teilnahme am neuen Pan European Green Corridor Network eingeladen werden. Die Zertifizierung gemäß dem **European Wilderness Quality Standard and Audit System** dokumentiert außerdem die außergewöhnlich hohe Qualität des vorgeschlagenen Wildnisgebiets gegenüber Wissenschaftlern, Besuchern, der Presse und anderen Wildnis interessierten Gruppierungen.

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100% RECYCLED

THE POTENTIAL WILDERNESS AREA GROSSVENEDIGER IN NUMBERS

185,600 HA

is the size of the Hohe Tauern National Park – the largest national park in the Alps.

> 16

glaciers are found within the proposed wilderness area.

9761 HA

is the size of the proposed wilderness area Grossvenediger.

3,660 M A.S.L.

is the hight of the highest point in the proposed wilderness area – the peak of Großvenediger.

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