Monitoring methods of winter backcountry recreation in a wildlife sanctuary

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Introduction

Wildlife management is an important issue in areas near human settlements and agricultural landscapes, such as the European Alps. In wildlife management, there are always questions such as whether populations of wildlife species are too large or too small and how livestock and predators interact (Robin et al., 2017). One management method for protecting wildlife populations is the definition of wildlife sanctuaries, which is accompanied by regulations that affect recreational uses, for example, in winter time snowshoe hiking or ski touring are only permitted on defined routes. The reason for such regulations is the high impact of backcountry winter sports activities on wildlife fitness, which has been proven in a broad range of literature (e.g. Ingold, 2005).

In the field of recreational activities, a rapid increase in snowshoe hiking and ski touring has been recorded in Switzerland. As a result, the number of Swiss winter sports enthusiasts aged between 15 and 74 increased by approximately 250% between 2000 and 2014, from around 70,000 to around 250,000 (Lamprecht et al., 2008, Lamprecht et al., 2015). It can be assumed that during the winter season, approximately 3,000 groups might be in the mountains on a winter tour on any single day. Current ZHAW research also suggests that the sharp increase in backcountry winter sports activities is moving these activities to other, even less frequented areas. For example, recreationists are spontaneously opting for alternative destinations or choosing to avoid routes in the future if the number of visitors on the planned route appears to be too high. This increases the area required for backcountry winter sports activities and as a result disturbances to wildlife are more likely and the undisturbed areas become smaller (Rupf et al., subm.).

In order to minimize the disturbance caused by skiers and snowshoe hikers, the Federal Hunting Ban Areas (EJBG) have a set of permitted routes approved by the competent cantonal authorities. The Federal Office for the Environment (FOEN) recommends the assessment aid for snow sports routes in protected areas for wildlife (Bolt, 2014), which has been used several times during its development and since its publication. While this method follows a pragmatic and objective approach, it is only partially accepted by snow sports representatives as a valid basis for negotiations on permitted routes.

In order to objectively assess the impact of backcountry winter routes and to increase acceptance of the results, the transparent recording of parameters such as the number of athletes or their area load is helpful. In this study we tested various different monitoring methods.

Methods and initial results

Data collection is still ongoing until end of May 2018. Therefore, in this abstract we describe the monitoring methods applied and our initial results. The final results will be presented at the conference.

The monitoring project was planned in collaboration with the cantonal authorities and was accompanied by stakeholder meetings. Additionally, information about the project was communicated to the public in newspaper articles as well as radio and local TV-broadcasts.

Table 1: Backcountry monitoring methods applied in the Kaerpf wildlife sanctuary, Glarus Switzerland; winter season 2017/2018.

Method	**Information gained**	**Advantages**	**Disadvantages**	**Experiences, remarks**
Aerial photos	Counts for specific and larger areas	Good overview of usage over a large area; non-intrusive	Dependent on diverse factors, such as snow conditions, weather conditions, daylight; only captures data since the last snow fall; no information on usage in forests; time-consuming analysis; for ski tourers, only descents could be counted	Orthophotos and oblique photos possible (oblique photos used in this study); airplane costs for oblique photos not prohibitively high
Automatic infrared cameras	Counts at specific sites (routes or smaller areas), type of activity	Additional information about the person, group, activities	Visibility of the camera; vulnerability to vandalism; time-consuming analysis; sensitive to data privacy; manual data collection needed; slightly intrusive;	Various incidences of vandalism occurred; blurring filter used; a machine learning photo analysis project is ongoing (blurring filter represents a challenge); data collection and functional check at the same time
Backcountry sports community websites	Possible routes in an area in addition to the officially communicated routes	Description of the route; non-intrusive	No visitor numbers available;	Valuable base information about the usage of an area
Cellphone usage data (in Switzerland)	Overall use of an area	Long analysis periods possible; non-intrusive; additional information about the visitors	Costly; no information about seldomly visited areas; min. grid cell 1 ha; min. visitor number 20; only aggregated data available	Not applied in this project; data availability differs in different countries
Local experts of backcountry winter sports and wildlife management	Subjective estimation of recreational use of a route or area and location of wildlife habitats area	Provides an overview of the different routes; experts are part of the project; non-intrusive	Uncertainty of the results	Even for experienced experts, difficult to estimate frequencies; widely varying estimations were made by the local experts

Passive infrared counters	Counts at specific site on routes	Long analysis periods possible; data transfer via GSM; remote functional check possible	No information about the type of activity; calibration counts needed; counts could be affected by weather conditions; adjustments required for snow depth; slightly intrusive	No functional problems occurred
Summit books	Counts at summits	Long analysis periods possible; cheap; sometimes additional infor-mation provided about the group; non-intrusive	Percentage of registrations is unclear; only on a few peaks	Very unreliable data; only available for very specific locations; the tradition of signing a summit book differs between peaks

As interim findings, we can state that the estimations of the wildlife habitat areas differed a lot between wildlife management experts and backcountry winter sports experts – the latter marked much larger areas whereas the wildlife experts indicated smaller and more detailed areas.
Compared to the passive infrared counter,, both groups of experts clearly underestimated the number of days of use in the low-level categories up to ten recreationists per day.
Due to the low-level usage of the area, as result of diverse applied monitoring methods, cellphone data could not be integrated in this monitoring project because of policies on data protection. Further analysis is still ongoing.

Conclusion

Optimally, in larger wildlife sanctuaries, the permitted route system for backcountry winter sports activities should be defined as the result of a participatory negotiation process. Of course, it is not possible to satisfy everybody's wishes, but the probability of a successful negotiation process is higher, if all stakeholders can rely on trustworthy figures for recreational usage. Based on this information, the impact of recreational use on different wildlife species and populations can be estimated and further management actions regarding the permitted route system can be planned with a majority of consensus.
We tested a variety of monitoring methods and found that a combination of methods needs to be applied to answer different questions about recreational usage. We received several critical responses to our visitor monitoring project and there were several incidences of different kinds of vandalism, especially to the automatic cameras.
The mixture of monitoring methods used did not include the application of cellphone usage data. However, in remote areas, such as the Kaerpf wildlife sanctuary that was examined in this project, cellphone usage data is very limited. Additionally, privacy policies will be an obstacle to apply cellphone data in large and mountainous areas with a poor network coverage.
So far, based on our results, we are convinced that it is important to integrate automatic counting systems in a visitor monitoring project even in large and remote areas, and especially in first campaigns. Based on these counts, it would be possible to develop visitor estimation models relying on other secondary data.

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