Annex “Buffer Zone Model Dürrenstein Wilderness Area”:

Buffer zone model of the Dürrenstein Wilderness Area

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Mandate

Climate change in the area of the Alpine arc and the concomitant warming as well as the threat of an increase in storm events, like the hurricane “Kyrill” in January 2007, indicate that, in the future, we may be faced with large-scale events also in the Dürrenstein Wilderness Area. Windfall, which must be considered as a part of natural processes and therefore does not run counter to the objectives of the wilderness area, may with the consequences of these processes, for example bark beetle infestation, put a risk to adjacent production forests in the area of the forest administration bodies. By identification based on the natural conditions and on habitat mapping in the framework of the LIFE Project Dürrenstein Wilderness Area the following agreement was adopted with the participation of the competent authorities (Nature Conservation Division of the Province of Lower Austria and the district administrative authority of Scheibbs) and based on decisions by the Scientific Board of the Dürrenstein Wilderness Area, Univ. Prof. Dr. Axel Schopf, Institute of Forest Entomology, Forest Pathology and Forest Protection of the Vienna University of Natural Resources and Applied Life Sciences:

The subject-matter forest administration and the administration unit for the protected Dürrenstein Wilderness Area establish buffer zones adjacent to the existing Dürrenstein Wilderness Area on production areas of the forest administration. The zones are selected exclusively according to technical criteria. The decision to establish the at most 300 m wide zone is therefore in particular due to the share of spruce in the buffer zone, the share of spruce in the stands of the wilderness area adjacent to the buffer zone, and the age of the stand. To be able to ensure that the delimitation is technically reasonable, the width of the zone can be exceeded by 250 – 300 metres as a maximum (e.g.: With a width of 300 metres, the boundary of the buffer zone would run across a piece of forest having a uniform stand structure). In this case the line of the stand, or the stand, is used as the boundary of the buffer zone up to a maximum distance of 550 – 600 m from the boundary of the wilderness area.

In this zone forest-sanitary measures are taken in an intensity preventing a comprehensive spread of the bark beetle, in particular of the eight-toothed bark-beetle (Ips typographus), to production forests outside the wilderness area and the buffer zone.

- The Forest Act provides that, during the vegetation period, employees of the forest administration have to check the buffer zone for bark beetle infestation at regular intervals. Also if the administration body responsible for the protected area learns of bark-beetle-caused damage in the buffer zone, such damage must immediately be notified to the forest administration, which then has to provide for its elimination.
- For the adult emergence of the young beetles, which occurs in spring from the trees infested already in autumn, the forest administration unit can, depending on the status of the adjacent stands and in consultation with the administration institution responsible for the protected area, prepare so-called “trap groups” of standing spruce trees (3 – 5 trees per site) in the buffer zone which, by girdling in autumn and timely application of pheromone dispensers in spring, serve to capture the emerging beetles. This is to avoid that, due to high snow, trap-trees are brought out too late or that trap-trees are covered with snow at the time of the beetle flight

in spring. The Forest Act provides that, if trap-trees are infested, additional trap-trees have to be set out. The administration unit for the protected area must be informed about the number of trap-trees.

- Moreover, in spring and, depending on the intensity of infestation of the standing trap-trees, at sensitive sites (e.g. severe infestation in the wilderness area in the previous year), the forest administration unit in consultation with the administration institution sets out trap-trees with pheromone dispensers to survey the development of the bark beetles and to capture the beetles in the buffer zone.
- The competent units decide jointly about the number of trap-trees. Once standing or lying trap-trees have been attacked, the forest administration must remove the pheromone dispensers without delay. The Forest Act provides that infested trap-trees, whether standing or lying, have to be removed from the buffer zone by the landowner or the manager of the area.
- In the autumn of each year the Institute of Forest Entomology, Forest Pathology and Forest Protection (Vienna University of Natural Resources and Applied Life Sciences) or a similar institution which has the confidence of both contracting parties surveys and maps the damage found in the wilderness area to document the development of the beetles there appropriately.
- To control bark-beetle development, and as a basis for the calculation of the bark beetle index, the forest administration unit has to set out pheromone traps at sites to be jointly determined by the contracting parties.
- Both contracting parties have the right to ask external experts to advise them.
- By establishing this buffer zone the contracting parties agree that any and all forest-sanitary interventions are prohibited in the wilderness area.

Financial arrangements:

The forest administration unit is compensated for its additional work and the lower yield.
This compensation is determined on the basis of the bark beetle index illustrated below: To avoid that costs become incalculable for the body managing the wilderness area, it was decided to spread them over several years.

Fictive example: The costs accruing for the wilderness area from the buffer zone in year xy amount to € 45,000. However, it has been decided that the wilderness area should pay a maximum amount of € 15,000.00 annually. The amount is distributed to three years with € 15,000.00 per year.
The advantages of this are:

- The annual costs remain the same and are therefore always calculable in the budget of the institution managing the wilderness area.

- It has been agreed to pay the annual amounts in a way that they are reasonable items in the budget of the wilderness administration institution and that other important tasks can be met all the same.
- The forest administration unit will at all events receive the total amount which was determined by mutual agreement and which it is entitled to, but in tranches paid over several years.
- The forest administration unit can, over a certain period, count on secure revenues.

The bark beetle index:

The essential component is the comparison between the volume of damaged wood which bark beetles, in particular the eight-toothed bark beetle, cause in the buffer zone and the volume of damaged wood detected in the spruce trees - which are of relevance to the eight-toothed bark beetle - of the production forest (remaining district), per hectare. For the comparison with the buffer zone, we use the amount of bark-beetle-caused damaged wood of those forest areas of the remaining part of the forest district that have a minimum share of spruce of 3/10. This ratio is given in solid cubic metres per hectare.
Under certain conditions, control captures and climate can be used as corrective factors in the evaluation and can then be taken into account in it. The burden of proof which leads to the application of these corrective factors lies with the administrative body responsible for the wilderness area. The index is made up of the following three components:

1. The factor "damaged wood":
The per-hectare amount of bark-beetle-caused damaged wood in the part of the forest district which is susceptible to bark beetle infestation is compared to the reference value in the buffer zone. This ratio decides about the amount of the annual compensation to be paid for the additional work and the loss of revenue in the buffer zone.
The exact amount of the compensation and the basis of the evaluation are illustrated in figure 1. The forest administration unit agrees to accept a percentage of damaged wood caused by bark beetles in the buffer zone 25% higher than that in the remaining forest district without compensation. From the factor 1.26 (= 1.26 times as much damaged wood per hectare in the buffer zone than in the remaining district) the forest administration body obtains 30 % of its additional expense and of the loss of revenue.
The further development of the amounts of compensation payments is shown in figure 1. From the factor > 11.0, the forest administration unit obtains 100 % of its additional expense and of the loss of revenue. (In the "disaster years" 2009, 2010 and 2011 the figure was between 6.0 and 7.5.) The calculation of the index follows mathematical principles.
The factor "damaged wood" always represents the maximum value. It can be corrected by the factors mentioned in points 2 and 3. As has been mentioned above, the burden of proof lies with the administration unit responsible for the wilderness area.

2. The factor "climate":
The climate stations in the wilderness area record the climate data (temperature, global radiation, air humidity, and wind velocity) all over the year. During the summer period also precipitation is recorded. Based on these data and the regional topography, the Institute of Forest Entomology, Forest Pathology and Forest Protection (IFFF) of the University

of Natural Resources and Applied Life Sciences models the possible developments of bark beetle populations using the phenology model of Ips typographus, PHENIPS.
The results of this modelling are used above all to check and assess the results derived from point 1. Significant deviations of the results of the climate model from the actual rate of infestation must be examined by external experts, who have to decide whether or not the factor "climate" should be taken into account in the evaluation.

3. The factor "control captures":
Control captures are carried out both in the wilderness area and the buffer zone (7 to 10 traps) and outside the wilderness area at comparable sites in the whole forest district (5 to 10 trap-tree sites). It is important to ensure maximum comparability of the site characteristics like, for example, exposure of the trap-tree sites, inside and outside the wilderness area. Controls comprise only the weekly numbers of captured bark beetles from the beginning of flight activity from mid-April (if this is possible in view of the snow situation) to September. The forest administration unit in consultation with the IFFF has to decide where the traps should be placed. The forest administration unit and the administration institution in charge of the wilderness area are jointly responsible for the care of the traps.

The numbers of beetles captured are considered in the evaluation as follows:
1. If, over the whole observation period of a year, the control captures in the buffer zone and in the remaining part of the district show the same average numbers of beetles (maximum deviation of 10 %) in the traps, the value calculated under pt. 1 of this index is reduced by 5%.
2. If, over the observation period, the average number of control captures in the buffer zone is significantly lower (difference of more than 25%) than it is in the remaining district, the value calculated under point 1 of this index is reduced by 15%. Usually this will happen only if damaged wood susceptible to bark-beetle infestation exists in the buffer zone and/or in the remaining district and is not timely or only unsatisfactorily removed by the forest administration unit.