



Re-establishment of Traditional Heathland Management Tools in the Federal Forest Service District Lausitz, Brandenburg State, Germany

Historical land management tools to preserve more than 100 ha of *Calluna vulgaris* (L.) Hull heathlands are currently reintroduced in Brandenburg State, Germany. The Federal Forest Service (FFS), in collaboration with the Fire Ecology Research Group / Global Fire Monitoring Center (GFMC), restored the traditional technique of prescribed burning as a landscape and habitat management tool.

The heathlands are located in a former Air Force bombing range of the German Democratic Republic. Training activities over more than two decades caused frequent fires which had a positive effect on the establishment of the *Calluna* heathland. The termination of military activities in 1989 required the development of new management tools to maintain this unique ecosystem. The FFS up to date had successfully applied mowing for short-term regeneration of heather. However, in the long run mowing as sole management tool proved insufficient to encourage *Calluna vulgaris* to propagate. For this reason the FFS decided in 2002 to employ prescribed burning as an additional management technique.

In February and late August 2002 the FFS District Lausitz, technically implemented by the GFMC and in collaboration with the local fire brigade of Döbern, conducted several burns, each not bigger than half a hectare. Focus of the FFS was the development of a cost effective management tool for the maintenance and improvement of Heathland ecosystems and habitat for Black Grouse (*Tetrao tetrix* L.). The aim of the GFMC was to promote the use of prescribed burning in land management in the Baltic Region. The project is also contributing to the development of a decision support system for catastrophic wildland fire events, a project conducted by the GFMC in the frame of the German Research Network for Natural Disasters.

With these projects the FFS District Lausitz has taken a lead role in advancing fire knowledge of German forest ecosystems, both in terms of wildfire control in the pinewood/heathland interface and in the controlled use of fire as a landscape management tool.

The project has shown that it is possible, both in operational and in ecological terms, to use prescribed fires with varying intensities to modify the *Calluna* structure, to suppress succession and improve Black Grouse habitat. The fires successfully simulated natural and human-made disturbance events. All fires burned within the prescription.

Plot Survey – October 2004

Evaluation of the areas burned in 2003 and 2004 showed very promising results in terms of *Calluna* regeneration and in eliminating tree and bush succession, particularly birch (*Betula pendula*). However, the areas burned in summer 2003 showed a wide variety of response to fire concerning the response of birch. On one plot (No. II) 70% of the total number of birch trees affected by fire re-sprouted, while nearly all trees were killed on a plot nearby (No. III) – a phenomenon that can be explained by different conditions of micro-relief and water availability. *Calluna* regeneration was good on both plots.

In contrast, in the late winter-burn areas the tree succession was well suppressed on all plots. *Calluna* regeneration on all plots was exceptionally good.

The last survey of the experimental plots I-IV was conducted in October 2004. New sub-plots were established in addition to the sub-plots that were already used for a Diploma thesis (Casper 2003). The sub-plots were 20 m² in size. Numbers per burned area (plot) vary according to different area sizes. In the sub-plots all trees (dead and alive) were counted as well as all *Calluna* plants. The numbers displayed in the tables are % that is alive and resprouting.

The sub-plots were situated in and around the center of the burned area to avoid edge effects, where the fire was not yet fully developed. Small trees that were consumed fully by the fire were not counted in this survey.

It was not possible to determine what type of fire burned on each sub-plot. For the summer fires we assume head fires, whereas the winter fires burned mainly as flank fires.

Table 1. Survey October 2004 – *Calluna* regeneration and birch survival

Plot I (Winter Burn 2001/2002)		
	Sub-Plots	
	A	B
<i>Calluna</i> regeneration (resprout, %)	99%	86%
Birch survival (resprout, %)	32%	12%
<i>Calluna</i> seedlings (number)	< 15	> 25

Table 2. Survey October 2004 – *Calluna* regeneration and birch survival

Plot II (Summer Burn 2002)				
	Sub-Plots			
	A	B	C	D
<i>Calluna</i> regeneration (resprout, %)	21%	16%	52%	42%
Birch survival (resprout, %)	88%	92%	93%	90%
<i>Calluna</i> seedlings (number)	0	<15	0	0

Table 3. Survey October 2004 – *Calluna* regeneration and birch survival

Plot III (Summer Burn 2002)		
	Sub-Plots	
	A	B
<i>Calluna</i> regeneration (resprout, %)	42%	35%
Birch survival (resprout, %)	12%	19%
<i>Calluna</i> seedlings (number)	<15	<15

Table 4. Survey October 2004 – *Calluna* regeneration and birch survival

Plot IV (Winter Burn 2002/2003)		
	Sub-Plots	
	A	B
<i>Calluna</i> regeneration (resprout, %)	98%	100%
Birch survival (resprout, %)	7%	6%
<i>Calluna</i> seedlings (number)	>50	>50

Conclusions

In conclusion of the October 2004 review first trends of fire response can be derived:

- The low number of *Calluna* seedlings on the summer burn areas may be a consequence of the extremely high fire temperatures that may have damaged the seeds. Temperatures over 500°C reduce *Calluna* germination. Temperature measurements on Plot II showed maximum temperatures of over 800°C, although these measurements were taken only on single points and not continuously all over the burn-area. Due to high fuel loads and extreme fire weather conditions temperatures most likely have exceeded 500°C all over Plots II and III.
- The fact that the birch trees on Plot II resprouted heavily compared to Plot III could be explained with slightly different soil structures on the two plots. The fire characteristics on both plots were very similar and do not allow any conclusions that could explain the difference in tree survival. Further experiments are needed.
- The comparison between the winter and summer burns show some significant differences. The survival of trees after a summer burn is very high, which was not expected. Resprouting of *Calluna* was relatively low and seedlings are hardly found on the summer burn areas.
- The winter burns all show extraordinary good results for the *Calluna* regeneration. The survival rate of trees is low. Also the number of *Calluna* seedlings is exceeding the expectations. It seems that late winter burns produce extraordinary better results, both in *Calluna* regeneration and killing of the tree and bush succession.

At this stage of time and research the programme will focus on winter burns as a regular management tool. It is planned to conduct more summer burns to understand the differences in the summer plots II and III.

Encouraged by these results the Fire Ecology Research Group and the FFS secured funding by the Brandenburg Nature Foundation (NaturSchutzFonds Brandenburg) to continue the prescribed burning programme in 2005 and 2006.

Due to the good economic and ecologic results the prescribed burning project in the FFS District Lausitz was presented on several public fora and workshops in Germany and neighbouring countries.

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Visual impressions of heather burning in Zschorno, Lausitz



Figure 1. Birch (*Betula pendula*) and heather (*Calluna vulgaris*) succession in Zschorno. In May 2002 the tree layer was completely inventoried before burning. Photo: GFMC.



Figure 2. Preparation of experimental sub-plots in which birch is cut before the application of prescribed fire. Post-fire studies will compare the recovery of standing and cut birch trees after the application of fire. Photo: GFMC.



Figure 3. Start of prescribed fire in Zschorno on 20 August 2002. The headfire is set at the edge of a burned fire break. Photo: GFMC.



Figure 4. Prescribed fire in progress in the birch-stocked plots (20 August 2002). Photo: GFMC.



Figure 5. Post-fire view of the August 2002 burn. The hot fire has removed the accumulated organic layer and provides suitable conditions for *Calluna* regeneration. Photo: GFMC.



Figure 6. The fire team: Staff members and forest workers of FFS District Lausitz, Cottbus University and GFMC. Photo: GFMC.