



Fifth seminar. Solsona, Catalunya. 15-17 October 2012

Baronia de Rialb pilot site. Support documentation.

Silvicultural models and treatments to create crown fire resistant and more resilient forest structures.

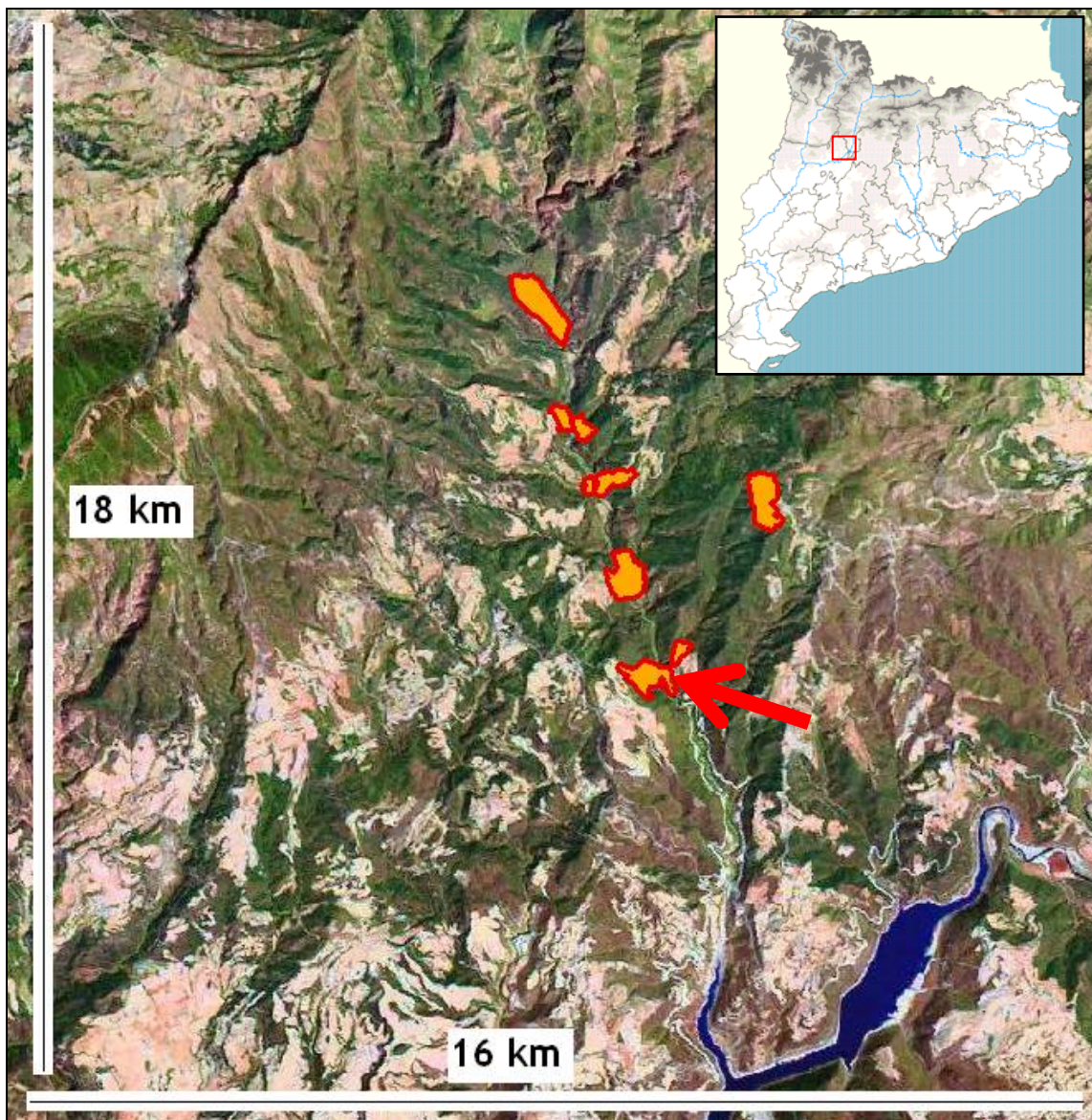
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## Study area: Rialb river basin

The technical Unit of the Catalan Fire Fighters Service (GRAF) identified the key areas that determine the development of large wildfires in the basin. These areas are called Strategic Management Areas (PEG, plotted in the figure).

Then, a prioritization was carried out, so the southern most PEG's were determined as the first to be treated. This is our pilot site to develop the treatment experience.



## Experience objectives

To design and execute silvicultural models and treatments to create crown fire resistant and more resilient forest structures.

The proposed treatments and silvicultural guidelines should reduce the risk of crown fires in the Rialb river basin. The aim is the promotion of crown fire resistant forest structures in the way that if a fire start or come from a neighbour area as a surface fire, fire would remain on the surface and wouldn't propagate through the canopy.

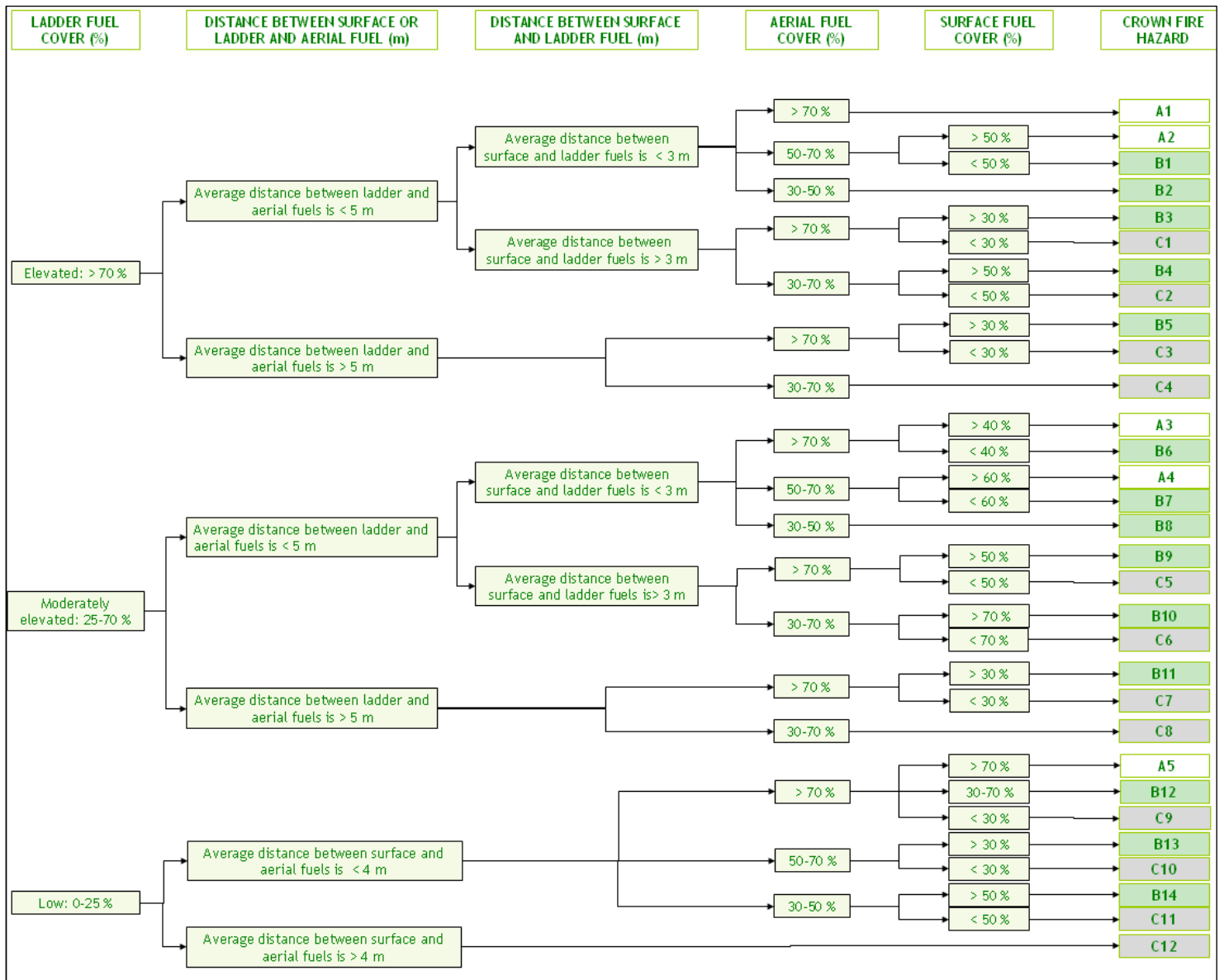
The proposed guidelines should promote the resilience of forests affected by fires, in terms of promoting mixed forests with broadleaves, sprouting species and fire adapted species.

Moreover, the designed treatments should be efficient in economical terms. These treatments are designed to be less expensive than traditional fire-prevention treatments, as well as more durable, with a long-term effect.

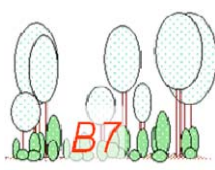
## Methodology

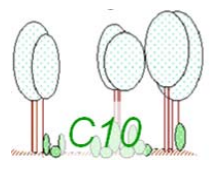
1. Stand characterization and dasometric inventory. How is our stand?
2. Identification of stand vulnerability to crown fire. Which parameters are the responsible of stand vulnerability?
3. Definition of desired low-vulnerability structure and design of management guidelines. How should be the stand managed to maintain a low-vulnerability structure?
4. Designing of silvicultural treatments to achieve a low-vulnerability structure. Which parameters have to be modified to create a low-vulnerability structure?
5. Technical description of the treatment to be implemented. What have to be done?
6. Monitoring the stand vulnerability evolution to evaluate the treatment effectiveness and duration.

# Crown fire hazard chart for *Pinus nigra*

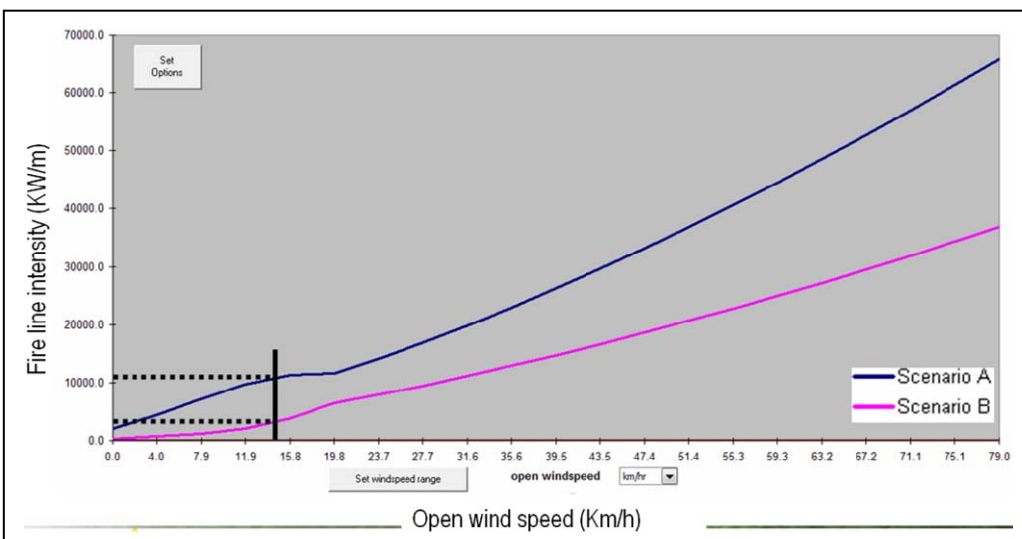
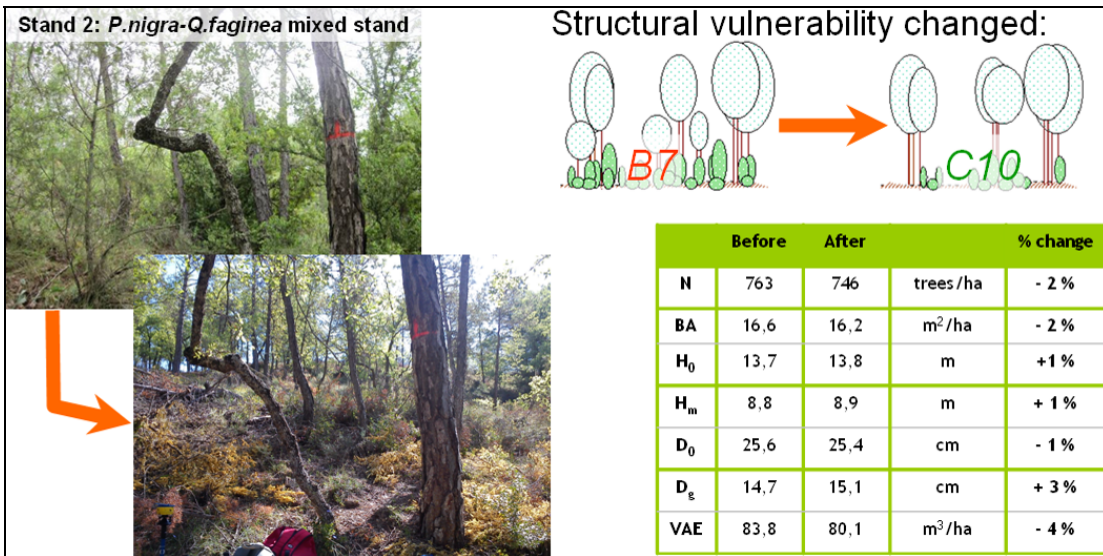
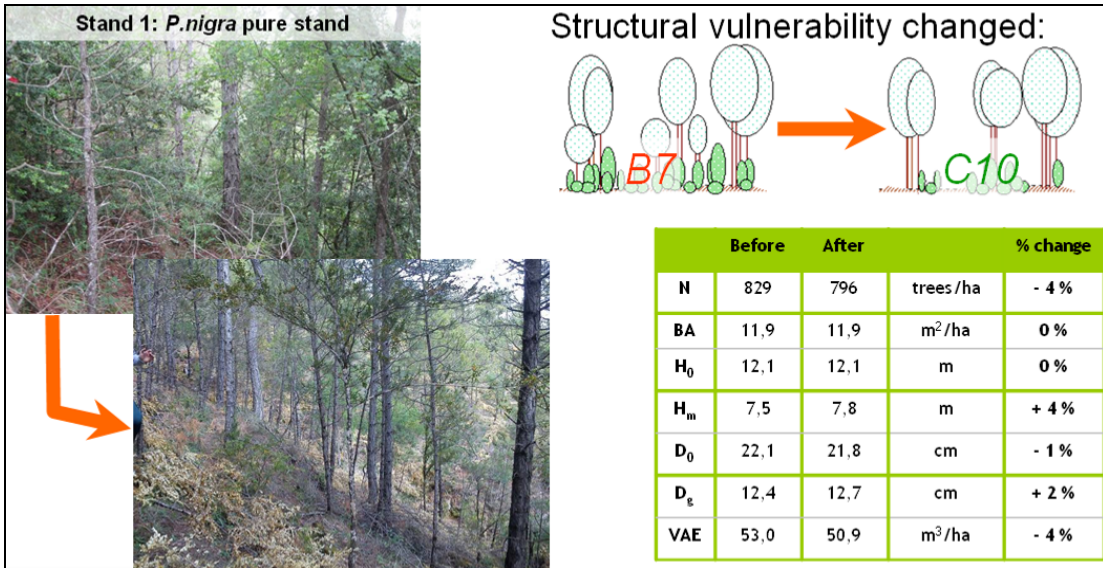


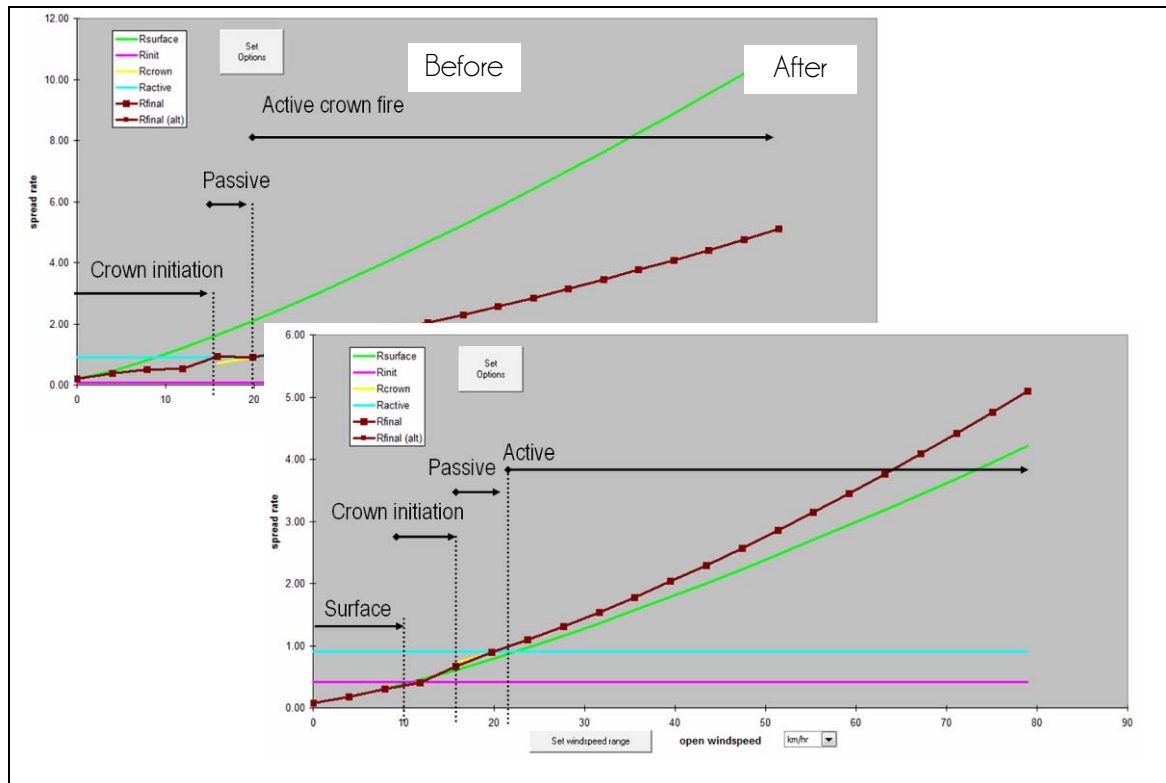
## Results

<i>Initial structural parameters in relation with stand vulnerability</i>		
Ladder fuel cover	25-70%	
Mean distance between ladder and aerial fuels	<5 m	
Mean distance between surface and ladder fuels	<3 m	
Aerial fuel cover	50-70%	
Surface fuel cover	<60%	
		Medium vulnerability

<i>Desired structural parameters in relation with stand vulnerability</i>		
Ladder fuel cover	<25%	
Mean distance between surface and aerial fuels	<4 m	
Aerial fuel cover	50-70%	
Surface fuel cover	<30%	
		Low vulnerability

<i>Treatment to be implemented</i>	
Reduction of surface and ladder fuels to a cover $\leq 30\%$ :	
	Selective clearings, affecting understory and small trees (DC < 7,5 cm) with alive crown under 1,3 m. <i>Keep small trees (priority Quercus sp.), where there is no other trees around and no problem of vertical continuity.</i>
	Elimination of broken trees (3-4 trees/ha, belonging to DC < 20).
Management of slash originated in the treatments:	
	Cut the slash with diameter > 5 cm in pieces 0,8-1 m long. Distribute the slash on the floor, avoiding piles higher than 30 cm.
	Keep the slash 10 m away from the roads (Forest Fire Prevention Law).
Pruning of <i>Quercus sp.</i> (approximately 200 trees/ha) In the case of Stand 2:	
	Pruning the trees higher than 4 m, leaving the alive crown at 1,5-2 m, measured at high side slope.





## Conclusions

The silvicultural treatments implemented are different to traditional treatments, so, previous training of workers was needed to ensure the correct realization.

The main change in the stand conditions was the creation of vertical discontinuity between surface and aerial fuels. The aerial layer was slightly affected, so the stand maintains the main tree characteristics. Nevertheless, structural vulnerability to crown fires has decreased. The aerial layer is expected to difficult the shrub development.

Total cost of treatments was 859 €/ha, with 5 day wages/ha (2-3 workers).