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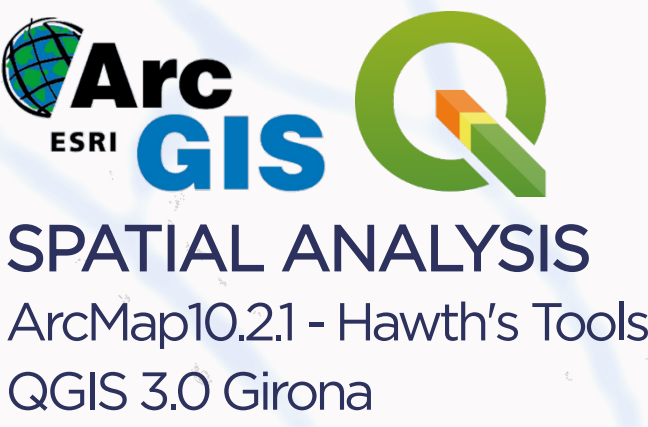
Background

Recently burnt habitats are a challenge for the persistence of animal populations. Insects that survive fire, or fire plus salvage logging, may show behavioural plasticity and manage to find adequate resources. However disturbed habitats are usually not favourable to insect survival and reproduction, because of increased predation and limiting resources. Whether insects survive, die or emigrate from burnt and burnt-logged areas depends on species-specific traits. Cicadas species live belowground as nymphs for several years, appearing aboveground as adults for just a few days. The goal of this study is to determine the effects of forest disturbances on cicada movements and survival.

Materials and Methods

The study was conducted from June 27 to July 14, 2017, in a Mediterranean landscape of pine forests and crops in Òdena (Barcelona). Part of the area was burnt in July 2015 by a 1296 ha wildfire. We set up six study plots (of around 37 ha each) of Aleppo pine forest allocated among three disturbance contexts: unburnt areas (UN), burnt-unlogged areas (BU) and burnt-logged areas (BL). A detailed photo-cartography of the plots was used to identify unburnt forest patches, standing dead trees across the landscape or general suitable habitat.

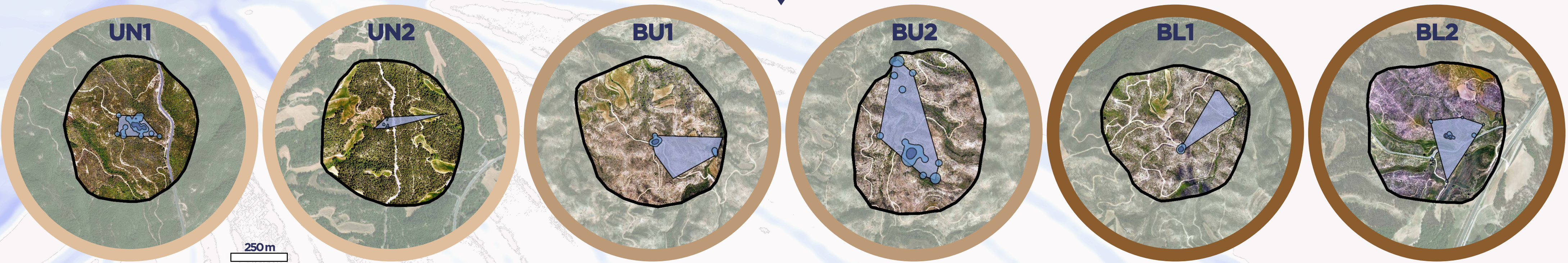
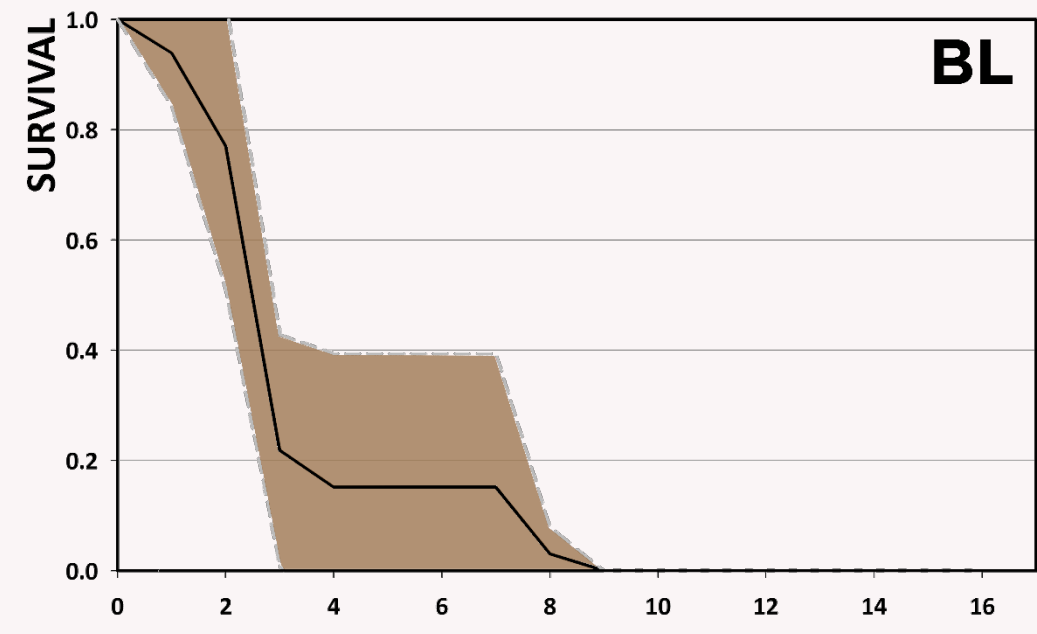
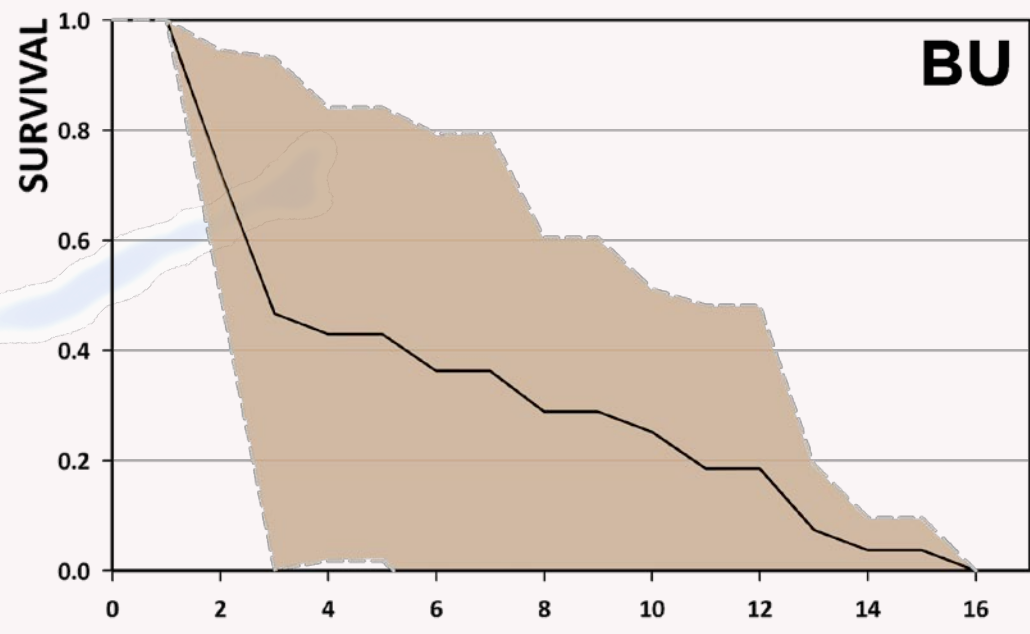
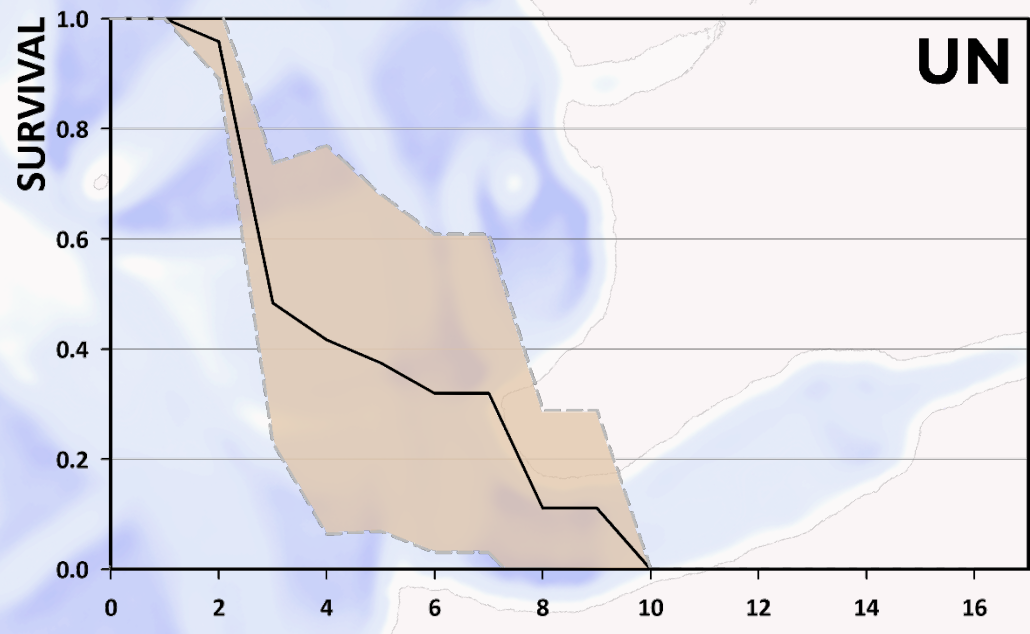
Newly emerged cicadas males were collected from a dense population 147 km far from the study area and transported to it immediately. A transmitter was glued with cyanoacrylate to the centre of the mesonotum. Each released cicada was located at least once per day and its substrate type, height above the ground and behaviour were recorded. Precise locations were verified in the field with the help of the detailed photo-cartography.



Results

- Low Survival mean individual lifespan of 3.9 ± 3.1 days.
- Cicadas from BU treatment show a greater survival than the other two treatments.
- Dispersal distance 92 ± 166 (n=63), a maximum of 890 m of accumulated movement per individual.
- All individuals had a mean core area (k50) of 0.22 ± 0.53 ha.
- Mean home-range estimates with MCP, CHP and k95 (ha) for all treatments were higher in BU.
- Fidelity index (k95/50) should be noted that it is higher in the non-burned areas than in the other treatments.

	UN (n=19)	BU (n=21)	BL (n=23)
Distances (m) n.s.	65.21 ± 95.97 (M=404.97)	150.27 ± 246.58 (M=889.66)	60.21 ± 101.77 (M=332.34)
Num. movements ** (UN-BL)	4.36 ± 1.63 (M=8)	4.05 ± 2.25 (M=10)	3.26 ± 1.86 (M=8)
MCP (ha) n.s.	0.24 ± 0.38	1.29 ± 1.14	0.67 ± 0.97
CHP (ha) n.s.	0.15 ± 0.26	0.55 ± 0.43	0.26 ± 0.38
k50 (ha) n.s.	0.04 ± 0.04	0.42 ± 0.88	0.21 ± 0.31
k95 (ha) n.s.	0.32 ± 0.36	1.68 ± 3.10	1.33 ± 2.14
Fidelity Index (k95/50) n.s.	7.17 ± 2.34	6.29 ± 2.59	6.34 ± 1.78
Lifespan (days) ** (UN-BL)	4.84 ± 2.97	4.05 ± 3.73	2.87 ± 2.12
Survival \pm n.s.	$3.30e^{-13} \pm 4.31e^{-13}$	$5.16e^{-12} \pm 8.36e^{-12}$	$2.33e^{-14} \pm 3.69e^{-14}$



Conclusions

- In burnt plots, the majority of long movements (>200 m) ended up in vegetation patches with unburnt canopy.
- These results emphasize the importance of unburnt patches, that should be excluded from conventional (complete) logging.
- The habitat suitability for *Lyristes plebejus* seems to decline from unburnt to burnt unlogged and finally to burnt logged areas.
- Individuals may be more exposed to predation and have lower resource availability in burnt logged areas.

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