Costs of passive rewilding in Barcelona: A Monte Carlo simulation experiment

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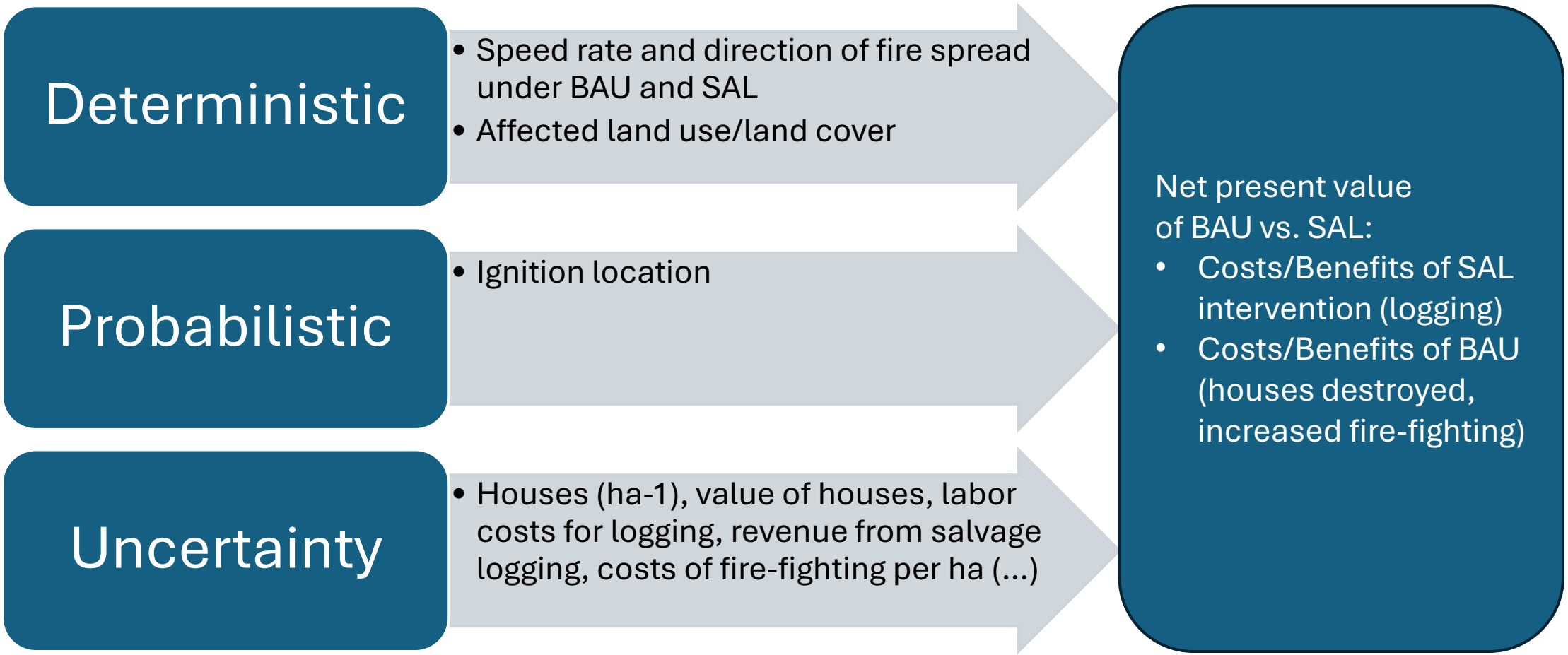
Motivation

- Agricultural abandonment leads to natural regrowth
  - Could be good for forest biodiversity but risky for wildfire severity
- Biomass (BM) under future climate scenarios
  - Short-term: increased fuel (dead biomass)
  - Long-term: decreasing fuel (limited BM growth)
- Management options:
  - Passive BAU (business as usual, no intervention)
  - Active SAL (salvage logging to remove dead biomass)

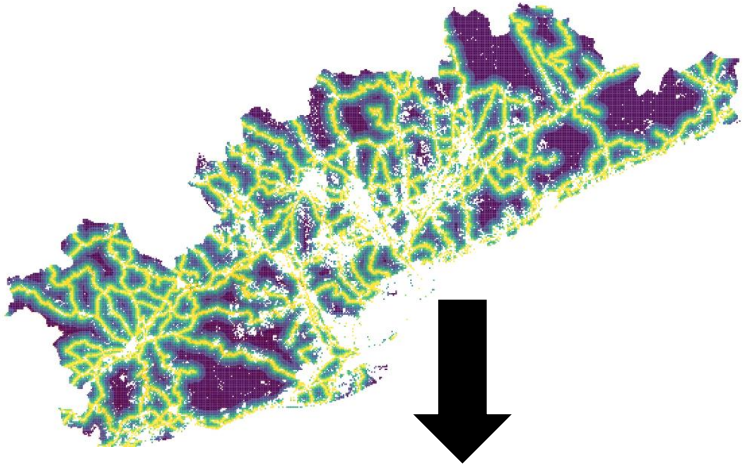
- RQ: What are costs and benefits of BAU vs. SAL?

Method (in a nutshell)

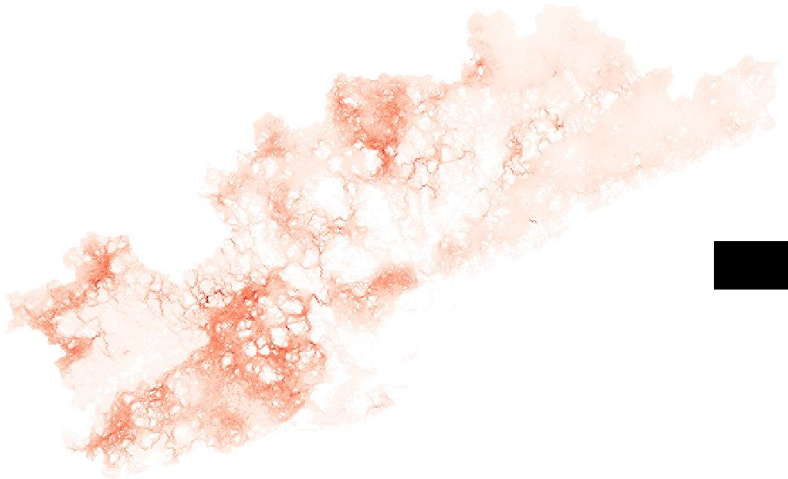


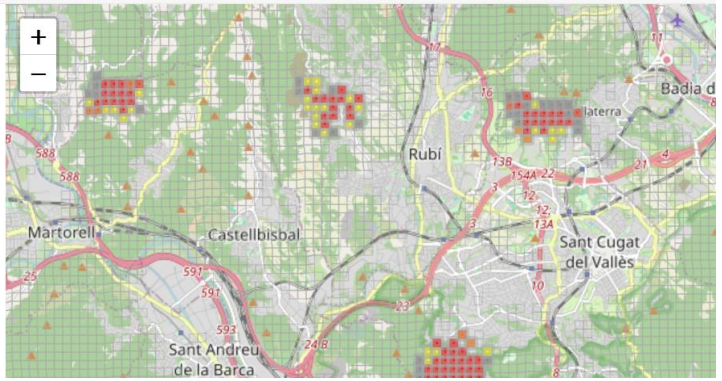
Method Part I

Ignition probability



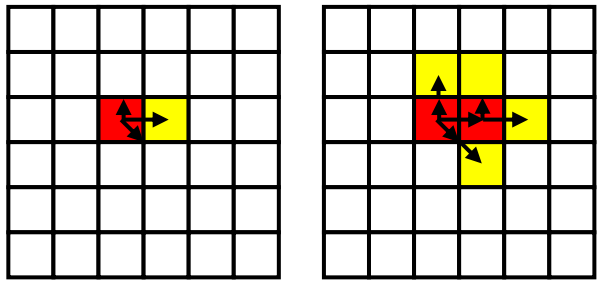
Biomass, Fire connectivity (BAU, SAL)



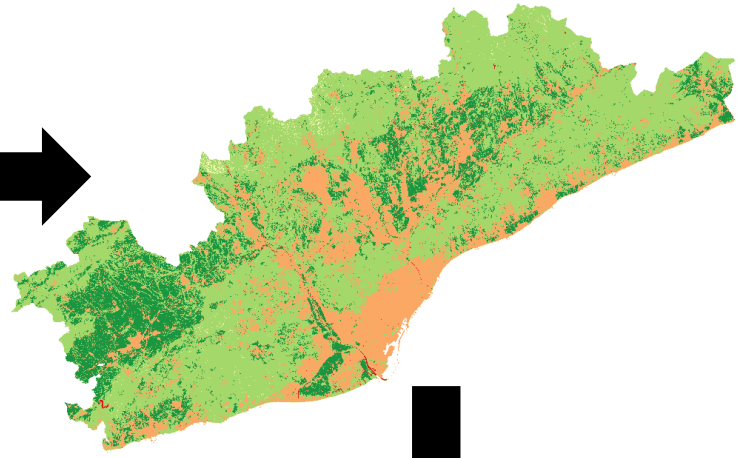


Time T0

Time T1

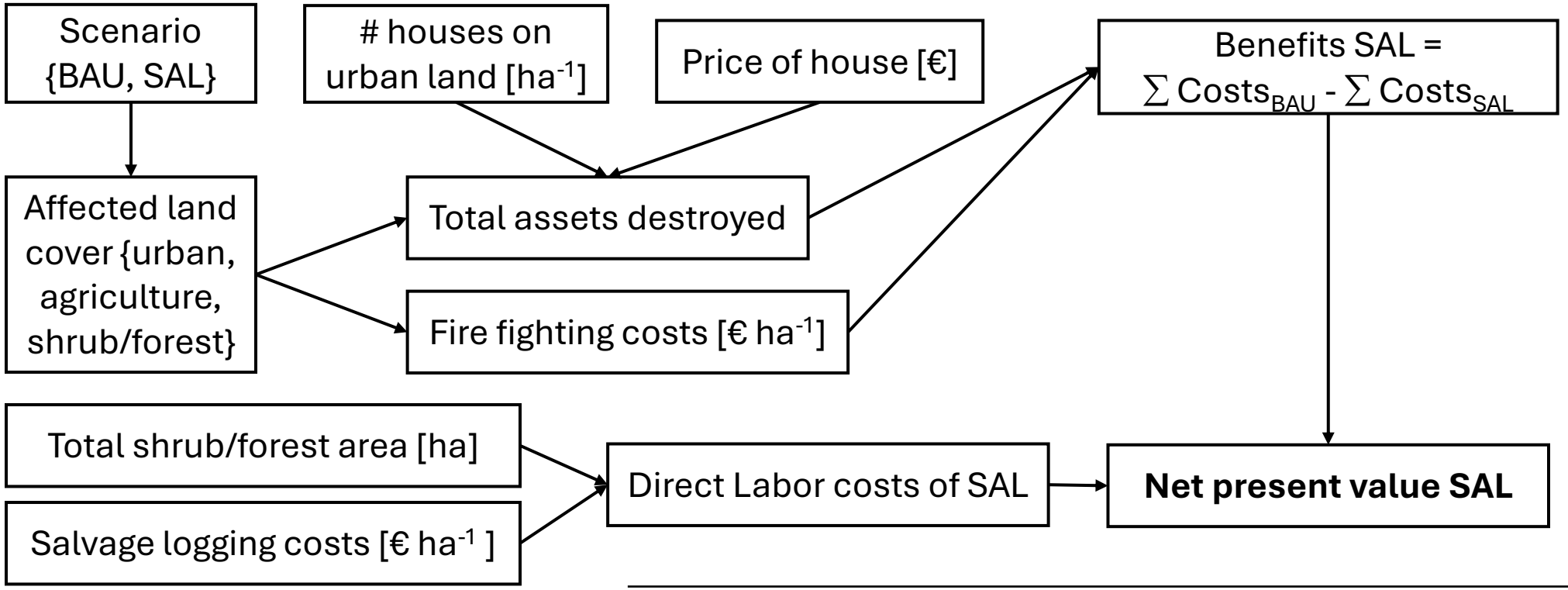


Affected landcover classes (ha)



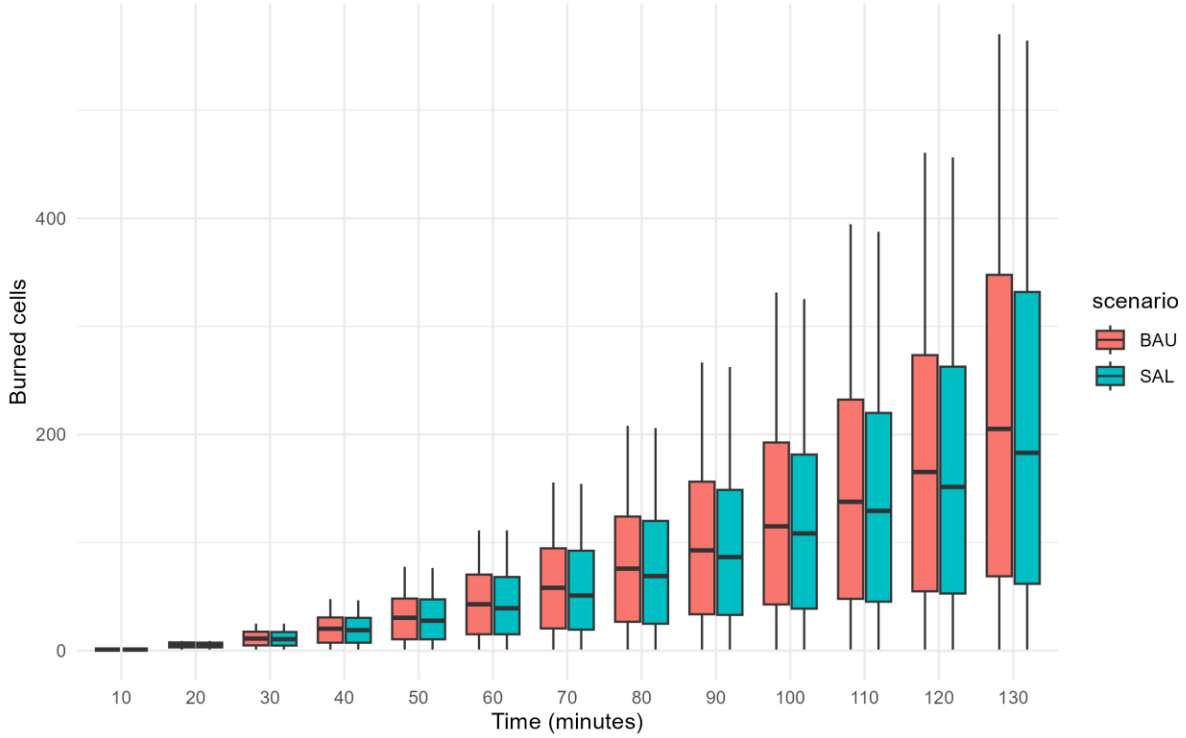
Monte Carlo simulation

Method Part II: A (too) simple cost estimation



Parameter	lower	upper	distribution
time_horizon	12	36	unif
houses_per_ha	1	20	unif
house_price	20000	1000000	lnorm
agric_land_price	10	5000	lnorm
fire_fight_cost_per_ha	10	5000000	lnorm
salvage_logging_cost_per_ha	10	200	lnorm

Results I (preliminary)



Total burned cells over time across scenarios for 1.000 random ignition points

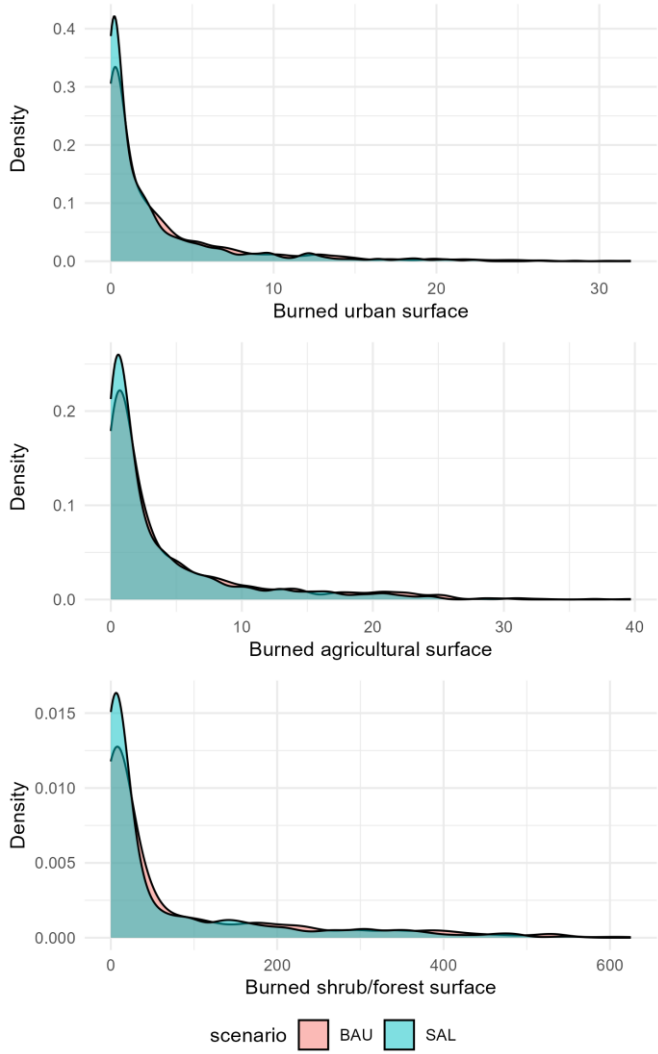
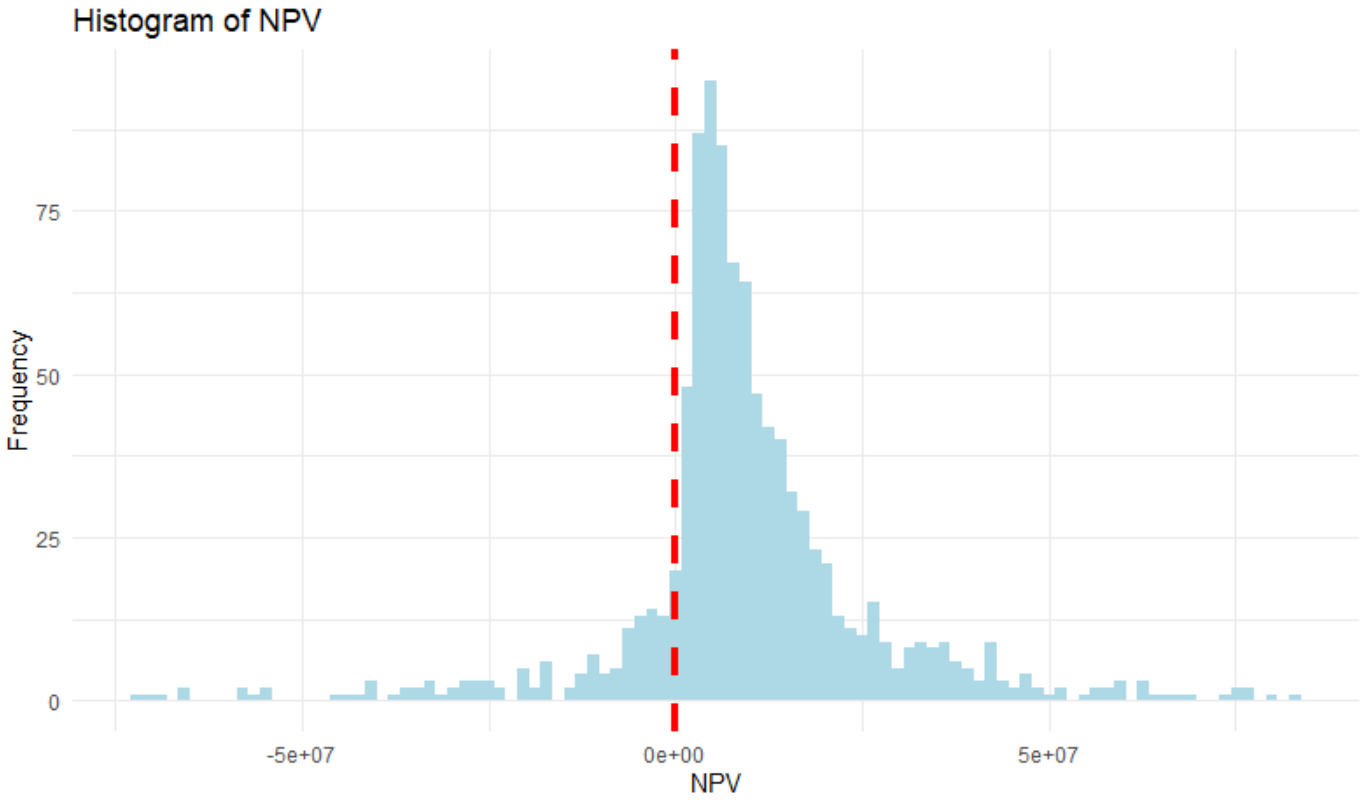
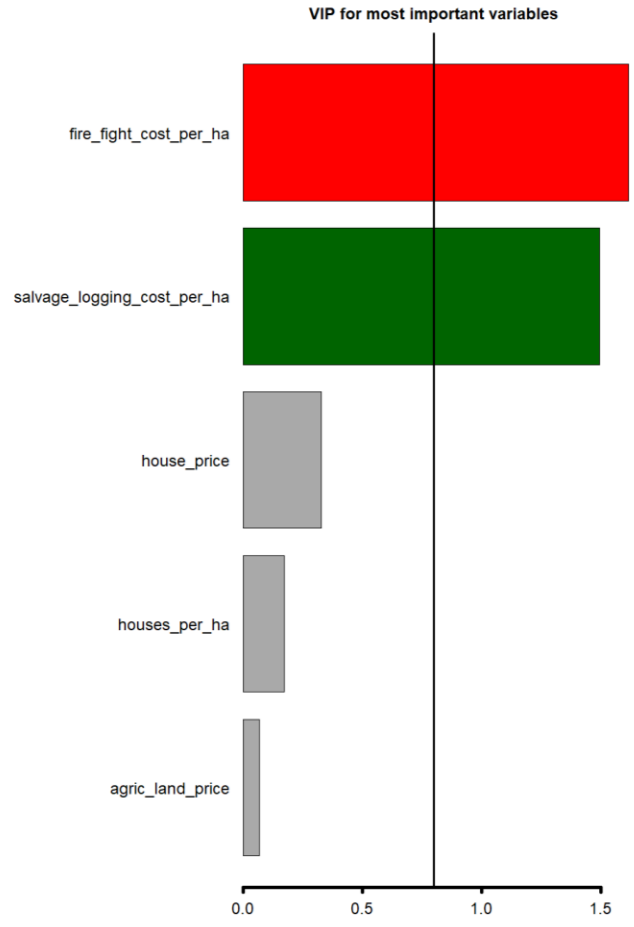


Figure 3: Distribution of affected landcover classes [ha]

Results II (preliminary)



Distribution of estimated net present value of SAL from 1.000 Monte Carlo simulations



Variable importance

Next steps

- Refine cost/benefit functions
- Improve parameter distribution estimates/assumptions

- Extend RQs: Can we reduce logging costs but increase the benefits of reduced fire damage by spatial targeting? I.e., NPV of SAL for every cell. Credible? Useful? Publishable?

- … (TBD)