

WF model persistence time

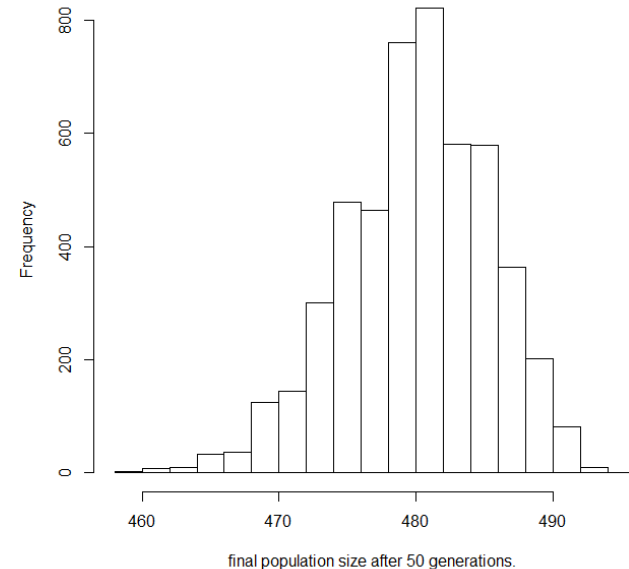
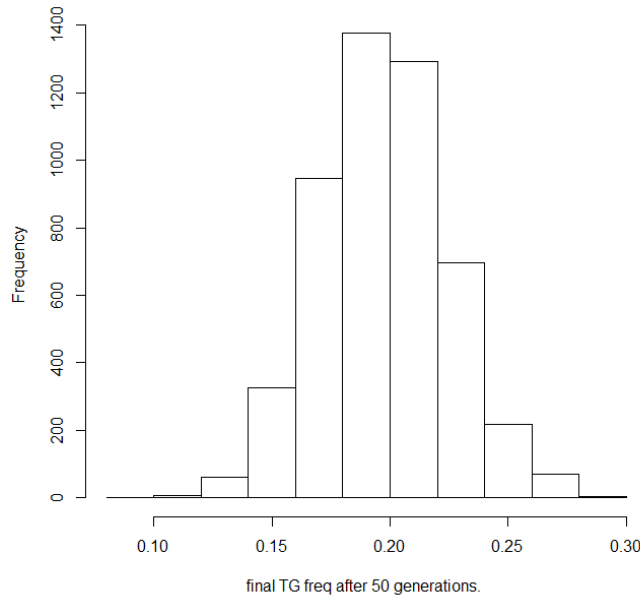
- Mean persistence time of an allele
$$\bar{t} \approx -4N[p_0 * \log(p_0) + (1 - p_0) * \log(1 - p_0)]$$
- The result above was derived by Kimura and Ohta (1969) via diffusion approximation

Gene drive simulator

- Please see attachment

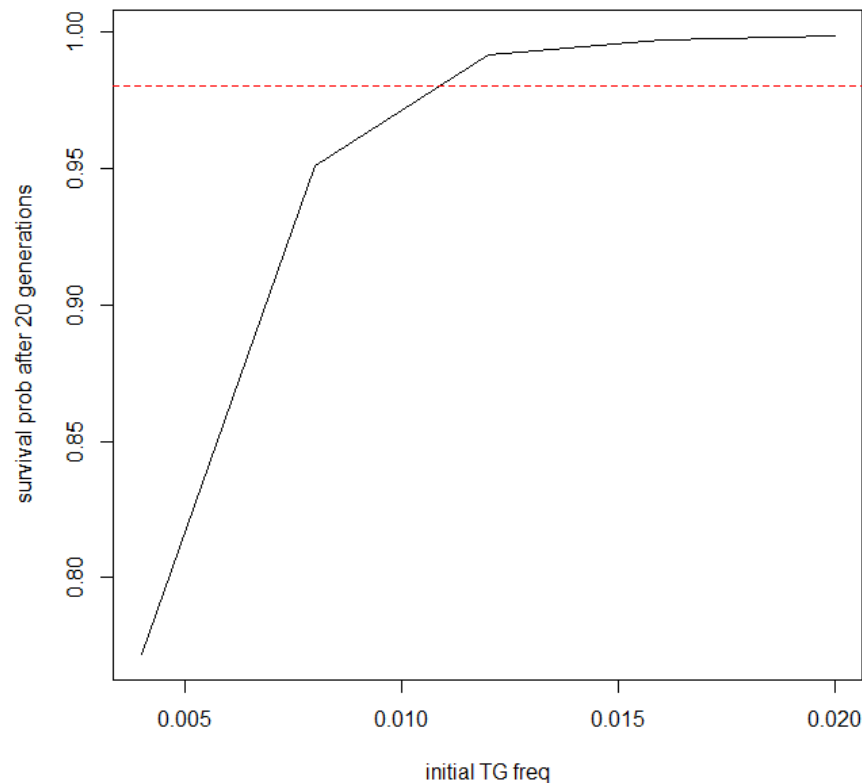
Problem I

- Based on 5000 independent simulations
 - average final population size = 480.48 (sd=5.37), which equates to $\sim 4\%$ population reduction

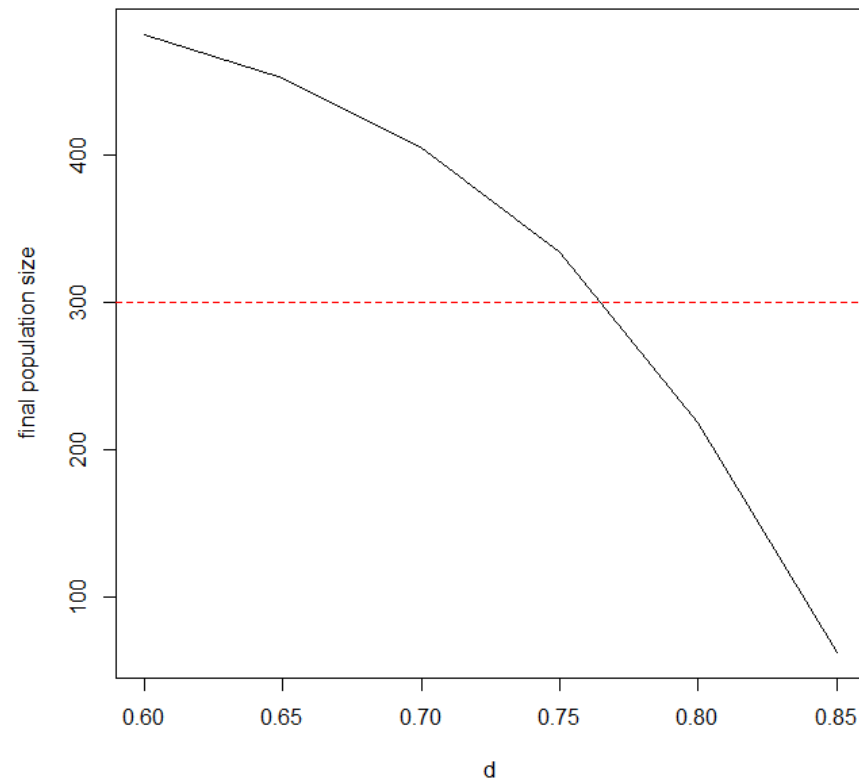


Problem II

- At 1% releasing frequency the survival is >95%.

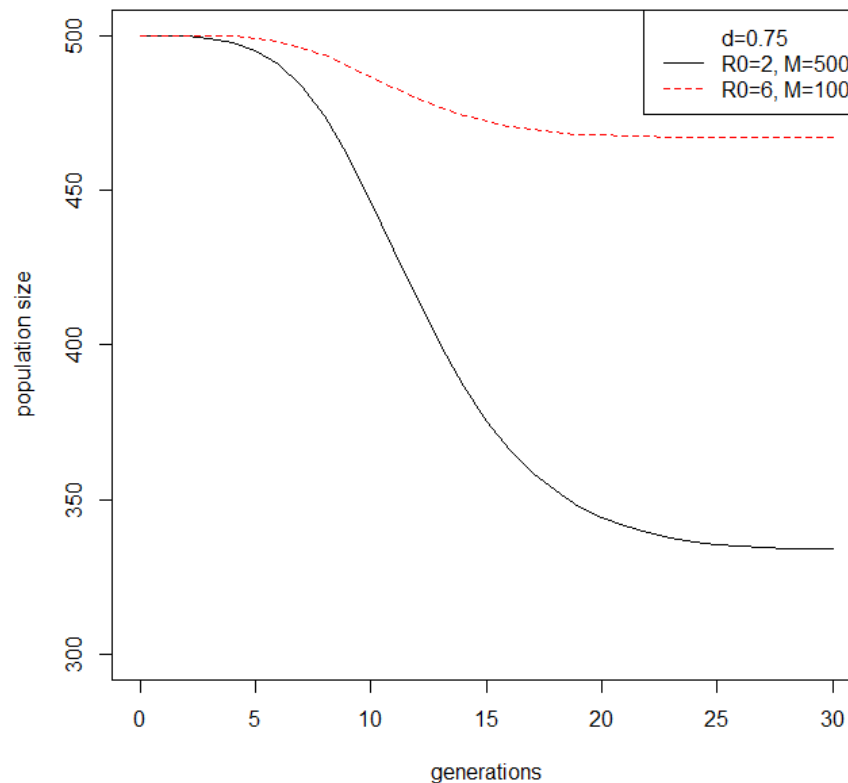


Problem III



Problem IV

- Populations with higher intrinsic growth rates are more difficult to control



Problem V

- One property of this gene drive is that the equilibrium TG frequency depends on d only
 - unrelated to initial frequency (as long as it survives)
 - unrelated to population sizes etc.
- The equilibrium frequency of TG $\approx (2d - 1)$
 - there is also an equilibrium population size
- To visualise this feature, we can simulate with different releasing frequencies, and track the TG frequencies over time. They will all converge to the same value.

