Figures for: Catastrophes, connectivity, and Allee effects in the design of marine reserve networks

Easton R. White,[1,2*] Marissa L. Baskett,[2,3], Alan Hastings[2,3,4]

{[1]Department of Biology, University of Vermont, Burlington, VT, USA \[2]Center for Population Biology, University of California, Davis, CA, USA, \ [3]Department of Environmental Science and Policy, University of California, Davis, CA, USA \ [4]Santa Fe Institute, Sante Fe, NM, USA}

{[*]To whom correspondence should be addressed: E-mail: eastonrwhite@gmail.com}
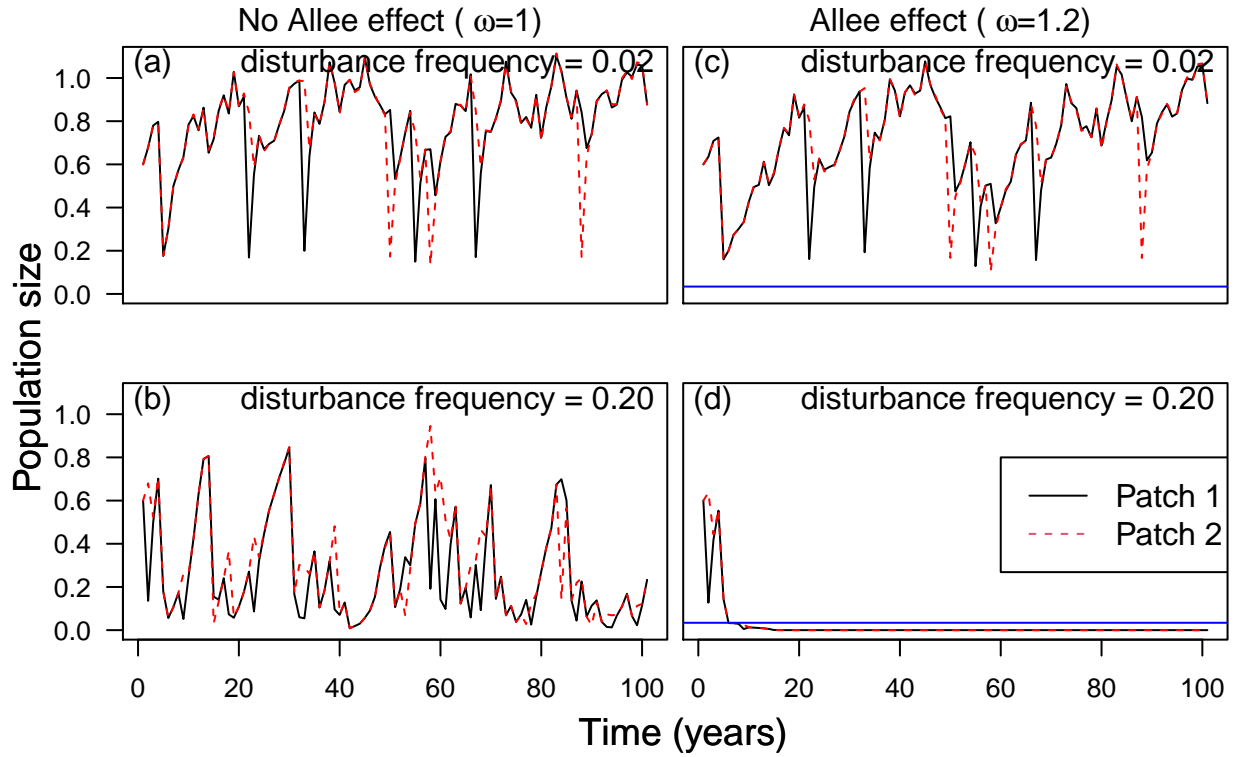
**Fig 2**



Figure 2: Example two-patch model simulation, each line denotes a different patch. The four panels represent different combinations of disturbance frequency and the presence ($\omega > 1$) or absence of an Allee effect. The horizontal line denotes the Allee threshold. The simulation is with the following model parameters: $r = 2.0$ , $K = 1$, $\delta = 0.01$, $\epsilon = 0.5$, and distance between patches of 40.
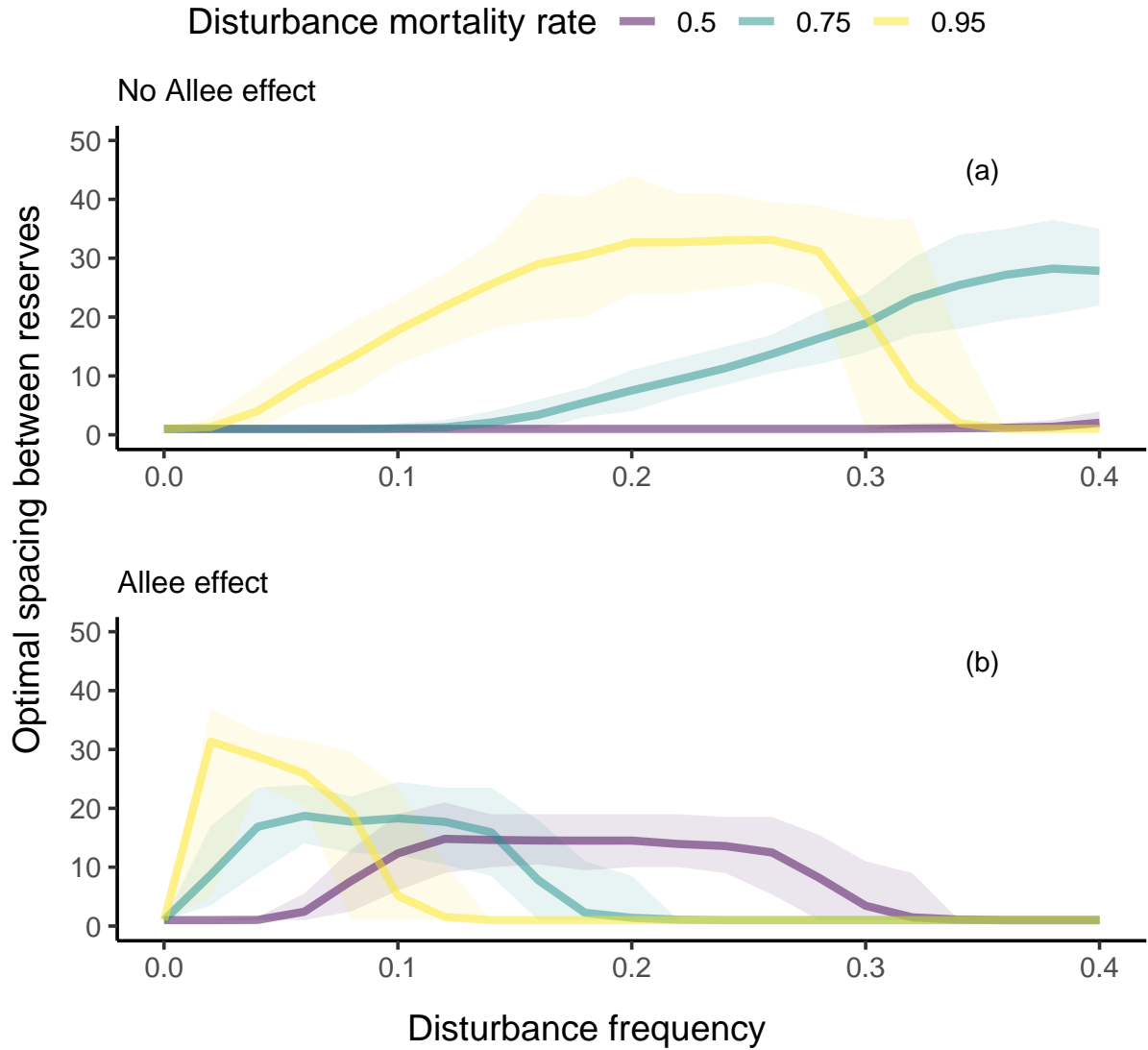
**Fig 3**



Figure 3: Optimal spacing for different disturbance frequencies and mortality rates. Optimal spacing for the Beverton-Holt model (a) without ($\omega = 1$) and (b) with an Allee effect ($\omega = 1.2$). Each line indicates a different disturbance mortality rate. The color of each point is the fraction of runs where the end population size was non-zero, a measure of persistence. These simulations are with the same model parameters as in Fig. 2.
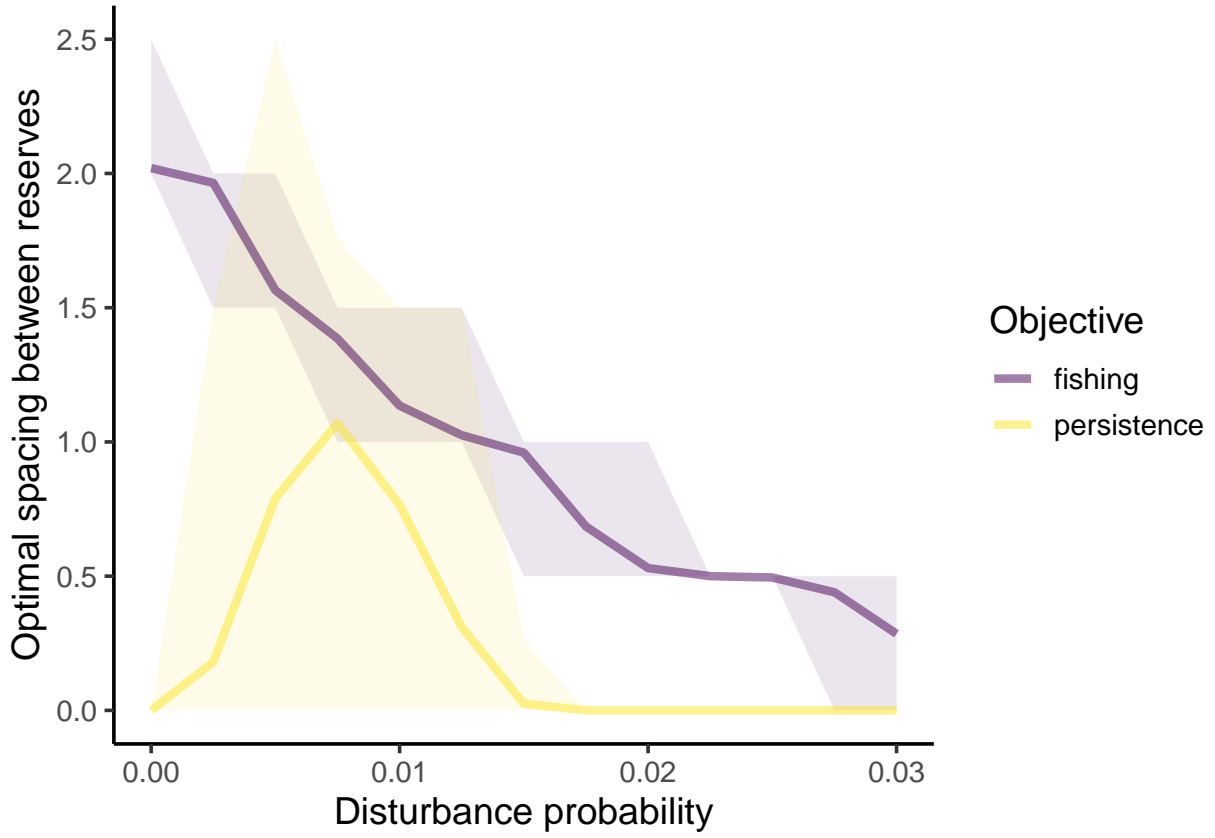
**Fig 4**

**Figure 5**



Figure 4: Optimal spacing between reserves (in an $n$-patch model) versus the probability of disturbance for three different objective functions. The parameter values used are: $\delta = 0.7$, $\omega = 1.2$, r = 3, and $\mu = 0.9$.
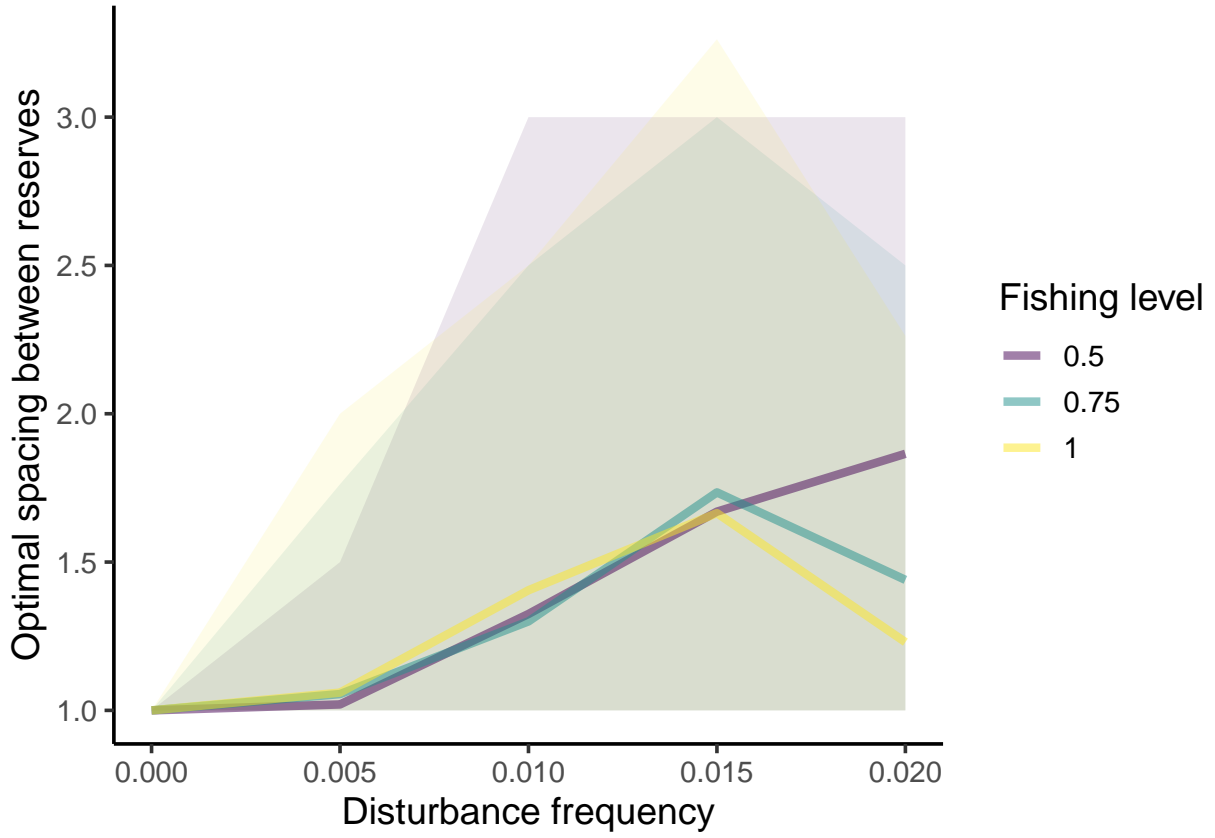
**Figure 6**



Figure 5: Optimal spacing between reserves (in an $n$-patch model) to maximize persistence for different disturbance frequencies and fishing levels outside of reserves (fraction of population harvested in each patch). The parameter values used here are: $\delta = 0.7$, $\omega = 1.2$, r $= 3$, and $\mu = 0.9$.
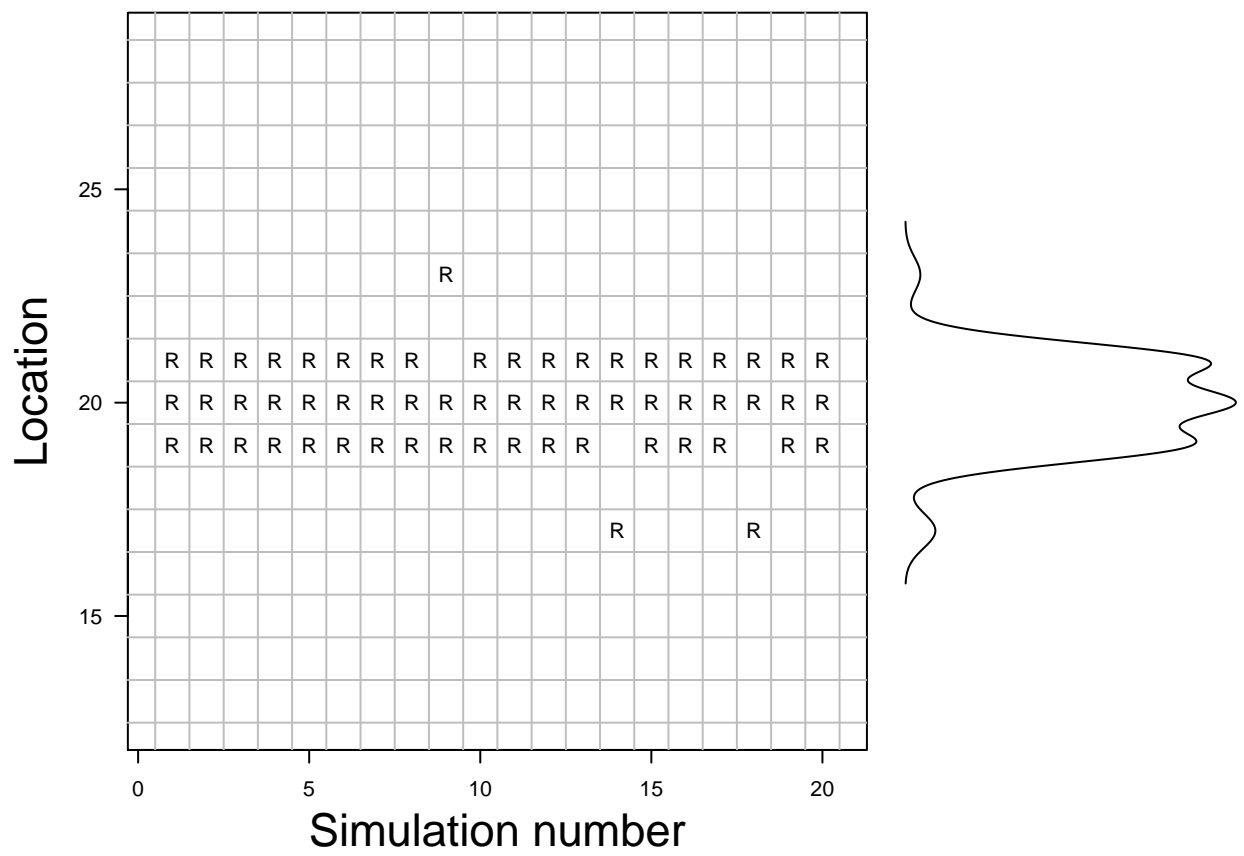
**Figure 7**

Figure 6: CAPTION HEREE.