

More general two-species competition

$$\frac{dN_1}{dt} = r_1 N_1 (k_1 - N_1 - \alpha_{2 \rightarrow 1} N_2)$$

$$\frac{dN_2}{dt} = r_2 N_2 (k_2 - N_2 - \alpha_{1 \rightarrow 2} N_1)$$

natural rate
of increase

r_1, r_2
↑ 20%

intra-species
competition

inter-species
competition

isocline = line of stability $\Rightarrow \frac{dN}{dt} = 0$

$$r_1 N_1 (k_1 - N_1 - \alpha_{2 \rightarrow 1} N_2) \stackrel{!}{=} 0$$

$$\begin{array}{l} r_1 N_1 = 0 \\ \swarrow \quad \searrow \\ r_1 = 0 \quad N_1 = 0 \end{array}$$

$$k_1 - N_1 - \alpha_{2 \rightarrow 1} N_2 = 0$$

$$+ N_1$$

$$= -\alpha_{2 \rightarrow 1} N_2 + k_1$$

$$= m x + b$$



