

S1 Table. Model Notation

Time

T : current generation time
 G : maximum generation time
 t : intra-generation time
 n : maximum intra-generation time

Agent associated designators

A_a : agent a
 N_A : number of agents
 $E_a(t)$: local environment of agent a at time t
 $B_a(t)$: biomass of agent a at time t
 $L_a(t)$: location of agent a at time t

Agent movement

$M(P_a)^a$ specifies if and where to agent a will move at time t , as determined by a vector of parameters P_a
 α : competition-tradeoff parameter (parameter a in Nova code)
 δ : neighbor-discount parameter (parameter b in Nova code)
 ρ : movement-threshold parameter (parameter w in Nova code)

Agent consumption

u : maximum resource extraction rate
 h : the extraction efficiency parameter
 q : the competition parameter
 κ : biomass conversion rate parameter
 c : metabolic loss rate parameter
 r : resource intrinsic growth rate
 g : reservoir parameter
 s : saturation parameter

Cells

C_{ij} : cell at row i and column j in the array
 C_k : cell k , where $k = 1, \dots, n_i n_j$ is a 1-D renaming of the matrix 2-D array
 $R_k(t)$: resource value of cell k at time t
 $N_k(t)$: number of agents remaining in cell k after movement at time t
 J_k^M : average number of agents per cell in the Moore neighborhood of cell k
 $F_k(t)$: resource extraction by an agent in cell k at time t