Table S1: Model parameters. The default values are obtained from a variety of sources (Gwadz and Collins, 1996; Smith and McKenzie, 2004; Tuno et al., 2005; Afrane et al., 2005; Chen et al., 2006); where no estimates were available values were varied within what we believe are plausible limits.

Parameter	Symbol	Default value
Parameters used in non-spatial models		
Egg laying rate	ν	$0.12 \quad (\text{day}^{-1} C_O^{-1})^*$
Feeding rate	γ_H	$0.015 \quad (\text{day}^{-1} C_H^{-1})^{**}$
Egg load after feeding	κ	120
Rate of mortality from competition	α	$0.05 \quad (\text{day}^{-1} n_J^{-1})^\dagger$
Background mortality from stage $X \in \{J, U, M, H, O\}$	μ_X	$0.1 \quad (\forall X, \text{day}^{-1})$
Rate of juvenile maturation	γ_J	$0.1 \quad (\text{day}^{-1})$
Mating rate	$m^\ddagger$	$0.01 \quad (\text{day}^{-1} C^{-1})^\ddagger$
Rate of HEG cleavage (X-shredder) or homing (classical HEG)	e	$0.6 \quad (\text{generation}^{-1})$
Demographic parameters exclusive to spatial models		
Mean number of eggs laid per oviposition	ω	40
Maximum mating distance	s_M	$0.3 \quad (\text{km})$
Feeding site detection distance	s_H	$0.5 \quad (\text{km})$
Breeding site detection distance	s_O	$0.15 \quad (\text{km})$
Basic jump rate	r	$10 \quad (\text{day}^{-1})$
Maximum jump distance	s_G	$0.3 \quad (\text{km})$
Strength of the reduction in movement near the object of search	β	10
Environmental parameters		
Mean density of feeding sites	θ_A	$(2^{1.5}, 2^{3.5}) \quad (\text{km}^{-2}; \text{pt.A,pt.B})$
Mean density of breeding sites	θ_B	$(64, 2^{6.5}) \quad (\text{km}^{-2}; \text{pt.A,pt.B})$
Breeding site turnover rate	σ	$0.05 \quad (\text{day}^{-1})$
Covariance between feeding and breeding sites	ρ	0
Covariance length scale	s_ρ	$0.5 \quad (\text{km})$
Mean density of sample points	θ_C	$100 \quad (\text{km}^{-2})$
Sample point turnover rate	σ_C	$0.1 \quad (\text{day}^{-1})$

* In spatial models, local density of breeding sites $C_O(x)$ at a location x is the number of breeding sites within distance s_O of x. In non-spatial models, C_O is defined $\theta_B \pi s_O^2 \omega / \kappa$.

** In spatial models, local density of feeding sites $C_H(x)$ at a location x is the number of feeding sites within distance s_H of x. In non-spatial models, C_H is defined $\theta_A \pi s_H^2$.

† In spatial models, $n_J = n_{J_i}$ is the number of juveniles at a breeding site i. In non-spatial models, n_J is set to n'_J / θ_B where n'_J is density of juveniles.

‡ In spatial models, local density of mates $C_M(x)$ at a location x is the number of mates within mating distance s_M of x. In non-spatial models, C_M is defined $C'_M \pi s_M^2$ where C' is the density of mates.

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