

# Predators, prey and pattern at disparate scales

Christine Dumoulin\*, Austin Milt, Paul Armsworth

Department of Ecology and Evolutionary Biology, The University of Tennessee, Knoxville, Tennessee, 37996, USA

\*cdumoulin@utk.edu



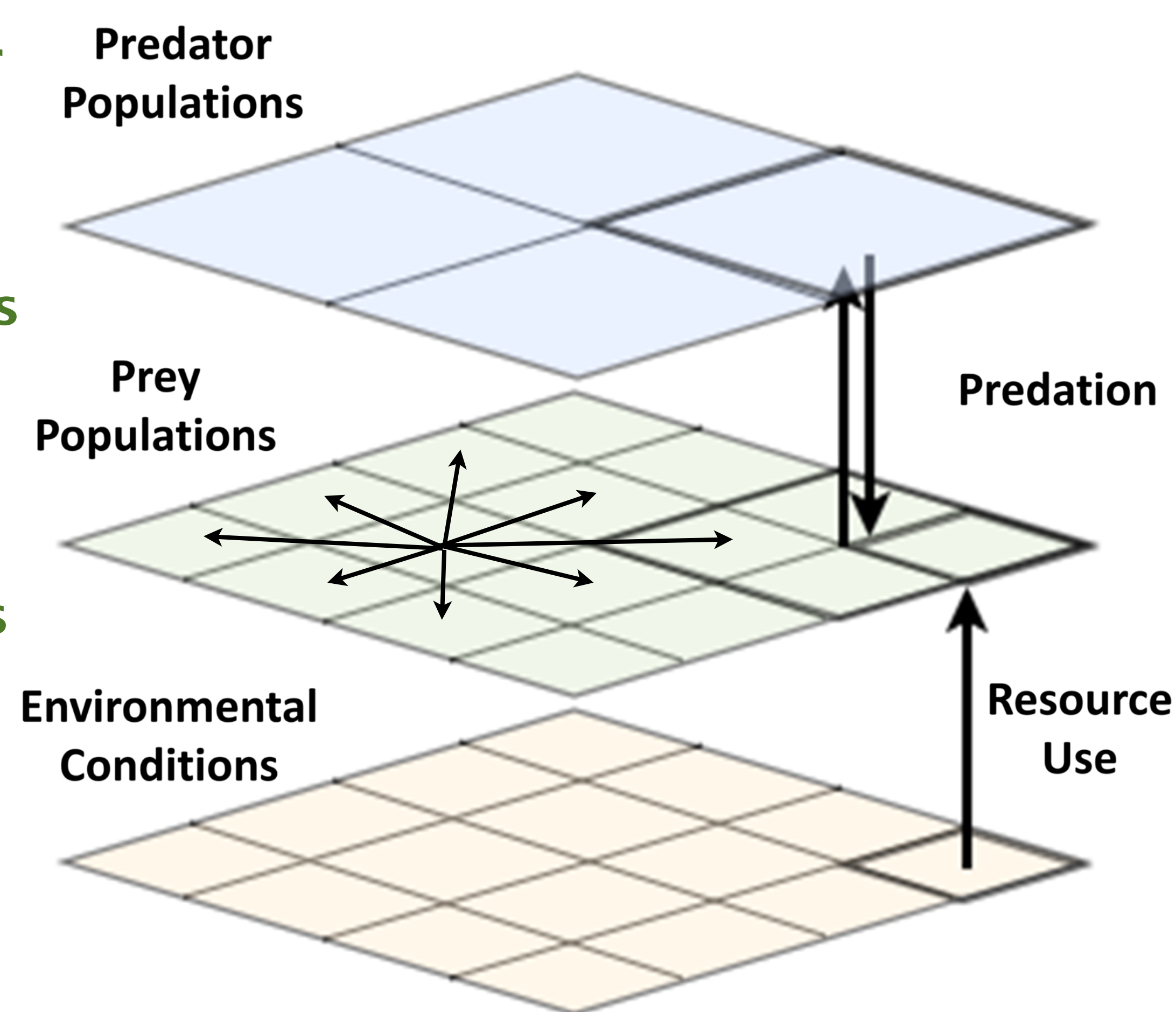
## INTRODUCTION & METHODS

Individuals, populations and species are distributed unevenly across natural landscapes. Spatial variation in environmental resources and species interactions affect where individuals are located.

We are interested in how differences in the scales at which interacting species perceive the environment interacts with resource variation to affect the distribution of populations across a landscape.

Schematic of our model (left). Dispersal occurs between neighboring cells only.

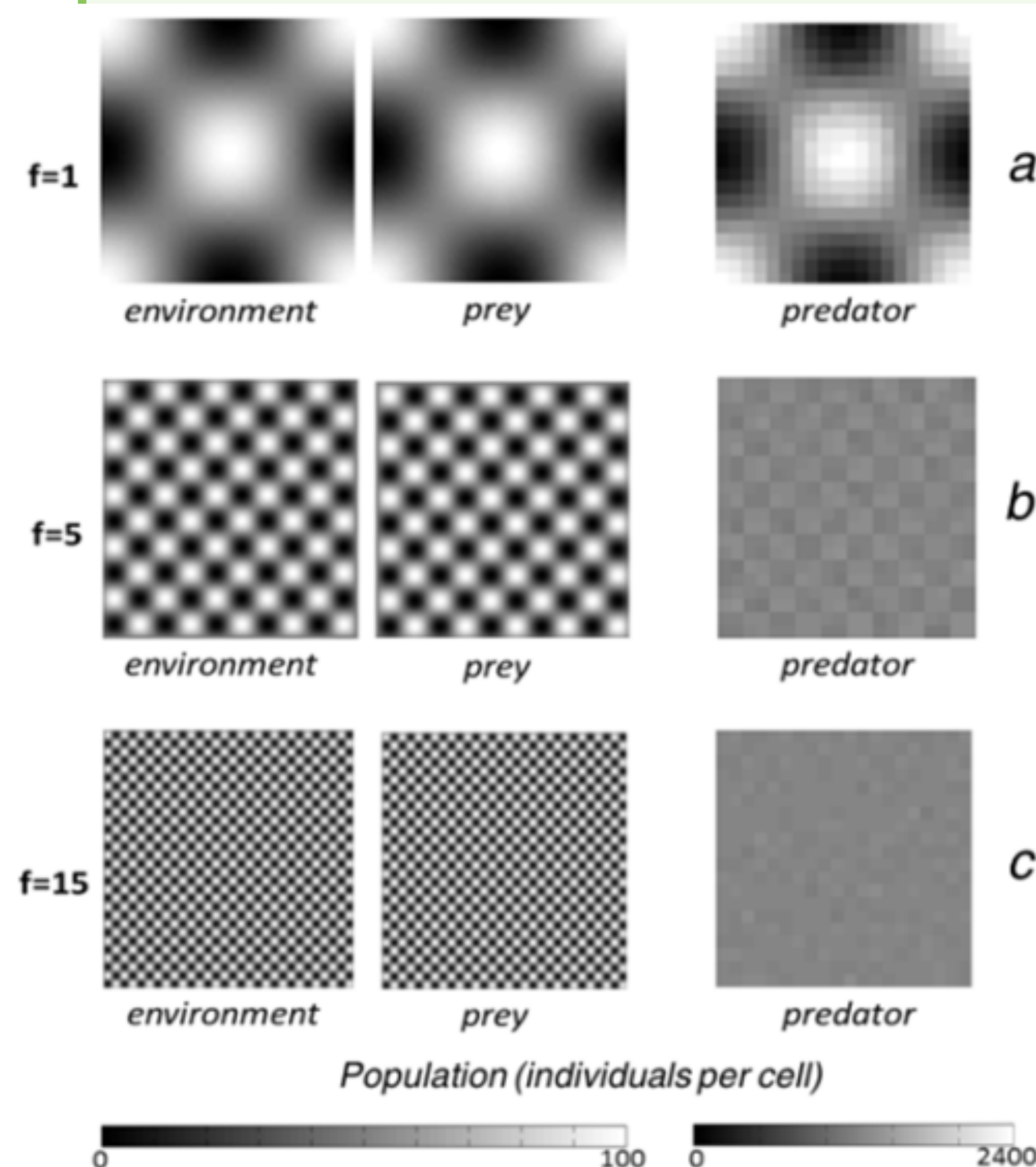
Example output (right), with 25 prey populations per predator population and varying environmental frequency (f, repeats per landscape).



## RESULTS

### How does prey-predator scale disparity affect the **prey's** ability to track differently sized environmental patterns?

Prey fidelity to the environment decreases slightly in environments with a smaller pattern size (higher environmental frequency), but does not differ significantly with scale disparity in most cases (below; right).



\* Similarity Metric:

$$1 - \sum (\mathcal{F}(s)_{ij} - \mathcal{F}(e)_{ij})^2$$

where  $ij$  are the pixels of the Fourier transformed image of the species ( $s$ ) and the environment ( $e$ ), respectively.

Predators' fidelity to the environmental pattern depends on environmental pattern size (left) and prey-predator scale disparity (right).

At the minimal and maximal scale disparities, environmental pattern size has little effect on the predators' distribution. At intermediate scale disparities, predators cannot track environmental pattern when that pattern size was smaller than the predators' lattice cells.

### How does prey-predator scale disparity affect the **predators'** ability to track differently sized environmental patterns?

