

## CHAPTER III

### **The effect of size and productivity on community properties during a natural colonization experiment.**

[Denise A. Piechnik](#), PhD, Dissertation UC Davis

#### **ABSTRACT**

Net primary productivity and habitat size can have major effects on community structure and species diversity. Larger and more productive habitats are predicted to have greater overall diversity and longer food chains according to the productive-space hypothesis. I tested these predictions by examining how plot size (1 m<sup>2</sup> and 10 m<sup>2</sup>) and productivity (fertilizer added or not) affected the assembly of insect communities in experimental field plots. In spring 2003 I sampled insect colonists four times from plots of California native annuals planted in a UC Davis field. Over 90,000 individuals of Coleoptera, Heteroptera, Homoptera, Hymenoptera and Neuroptera were keyed to family and assigned to morpho-species via a study-specific voucher collection. Consistent with other experiments, plot size influenced community properties at higher trophic levels more so than productivity. Large plots supported higher predator-prey ratios suggesting that relative predator densities are greater in larger habitats possibly due to energetic constraints imposed by diminished energy transfer. This strong effect occurred even though larger plots had no greater abundance than smaller plots. Small plots unexpectedly produced greater overall insect densities, which could indicate decreased predation pressure due to edge effects, or less predator suppression or subsampling/disturbance effects than on large plots. Strong date effects and other size and fertilizer trends were also detected and deserve further investigation. Lack of diversity trends on these “terrestrial islands” suggests that other ecological factors may predominate over area and productivity effects in influencing diversity. Other factors may include but not be limited to host-plant diversity, habitat heterogeneity, and potential loss of regional diversity from anthropogenic disturbances.

**KEYWORDS:** habitat size, habitat quality, diversity, food-chain length, productive-space hypothesis, trophic rank, trophic level, productivity, biodiversity, California native annual plants, terrestrial islands, body size-habitat area relationship, density-abundance relationships.