

## RELATION OF BIRD DENSITIES TO ABUNDANCE OF THEIR INSECT PREY IN SALIX HABITATS

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### Objectives

Insectivorous birds at temperate latitudes may or may not be food limited, and the degree to which they are can be assessed, by hypothesis, from the degree to which the densities of insectivorous birds are correlated to their food supplies, both within a habitat type between different years of different productivities, and among habitat types of different productivities in the same year. Speculation on the food limitation of such consumer organisms has been extensive, but little data exists. My studies in Jackson Hole Wyoming are designed to provide data on bird density and on concomitant insect density.

### Methods

Birds are censused almost yearly in  $5\frac{1}{4}$  acres of willow marsh opposite the site of the old Research Station. By use of successive mapping of activities in a 15m grid system, the densities of 5 spp. of Parulid warblers, 4 species of Emberizid finches, and one sp. of Tyrannid flycatcher are assessed. Insect densities are estimated with the use of Tanglefoot traps, using standard methods of  $\frac{1}{2}$  oz Tanglefoot per side of 10x10cm flat-white plaques. The plaques are arranged 5-10 per station at different heights about the ground, and 4-8 stations are used throughout the study area. Insects are removed from the plaques daily, and their biomass, size distribution and taxonomic categories recorded. These studies have been in progress since 1966, with critical data collected during the last 4 years, including 1977.

### Results

Insect biomass varies 2-3 fold between years, and bird densities between years are correlated with these changes. Within a given year, the foraging height distributions of the insectivorous birds sum to match the distribution over height of available insect resource, and the bird densities are adjusted such that a close fit is observed between the insect biomass distribution and the bird utilization. These results are still in the analysis stage, but preliminary results indicate close tracking by bird populations of local (between-site) and temporal (between-year) variation in food supply.

### Discussion

The data collected in this study constitute a definitive test of Mac Arthur's minimization principle, in which a least-squares fit is produced, via competitive interactions within and between species, between consumer utilization and resource abundance. Problems still to be resolved include aspects of resource renewal rate and the interaction of this parameter with standing crop estimates.