ARTHROPOD ABUNDANCE & PHENOLOGY DURING SONGBIRD BREEDING SEASON AT MAPS BANDING SITES IN WESTERN NORTH CAROLINA

LAUREN WHITENACK
PH.D. STUDENT
UNIVERSITY OF NEVADA RENO

Parasitic wasp sp.

Indigo Bunting

Saddled Prominent Caterpillar

Moth sp.

Food resource availability during breeding season is critical for animals to survive and successfully reproduce. When food resources become scarce, survival rates and breeding success may decrease, eventually threatening the persistence of a population or species. Many songbirds rely on arthropods (insects and spiders) during breeding season, especially soft-bodied insect larvae such as caterpillars, to feed their young. Since insect populations are seasonal and cyclical, and the timing of emergence of insect taxa varies annually, one would expect songbirds to want to synchronize their breeding timing with peak insect abundance.

Data on insect numbers during breeding season is lacking broadly, and more data is needed to assess how phenology* and abundance change over small timescales (seasonally) and over climate change timescales, and how these changes might affect songbird populations. This summer, while I worked as a songbird bander for Blue Ridge Bird Observatory (BRBO), I also studied arthropod phenology and abundance at three of our Monitoring Avian Productivity and Survivorship (MAPS) banding sites in western North Carolina: Cowee, Kituah, and HBS.

I sampled arthropods using two methods: 1) *Caterpillars Count!* (CC!; www.caterpillarscount.unc.edu) beat sheet sampling to collect foliage-dwelling insects and spiders; and 2) Malaise trap sampling to collect flying insects. Over the course of the banding season, I conducted 9 CC! surveys at each of the three MAPS sites, approximately once every 10 days in the afternoons after banding. I found that the peak caterpillar abundance based on biomass per survey (mg) was June 24 for Cowee, June 23 for Kituah, and July 9 for HBS. According to the other two methods of calculating abundance, caterpillar abundance may have more than one peak at our sites: in mid-June, early July, and perhaps another in late July-early August at our lower elevation sites; and in early July and early August at HBS. Cowee had more than double the total biomass of arthropods compared to the two other sites, and the greatest biomass of caterpillars (Figure 1). Additionally, I collected and identified a total of 1,353 arthropod specimens from 8 Malaise sampling windows at the three sites throughout MAPS season. I will use these Malaise data to supplement CC! data, since beat sheet sampling is biased against flying insects.

*Phenology: a branch of science dealing with the relations between climate and periodic biological phenomena (such as bird migration or plant flowering)
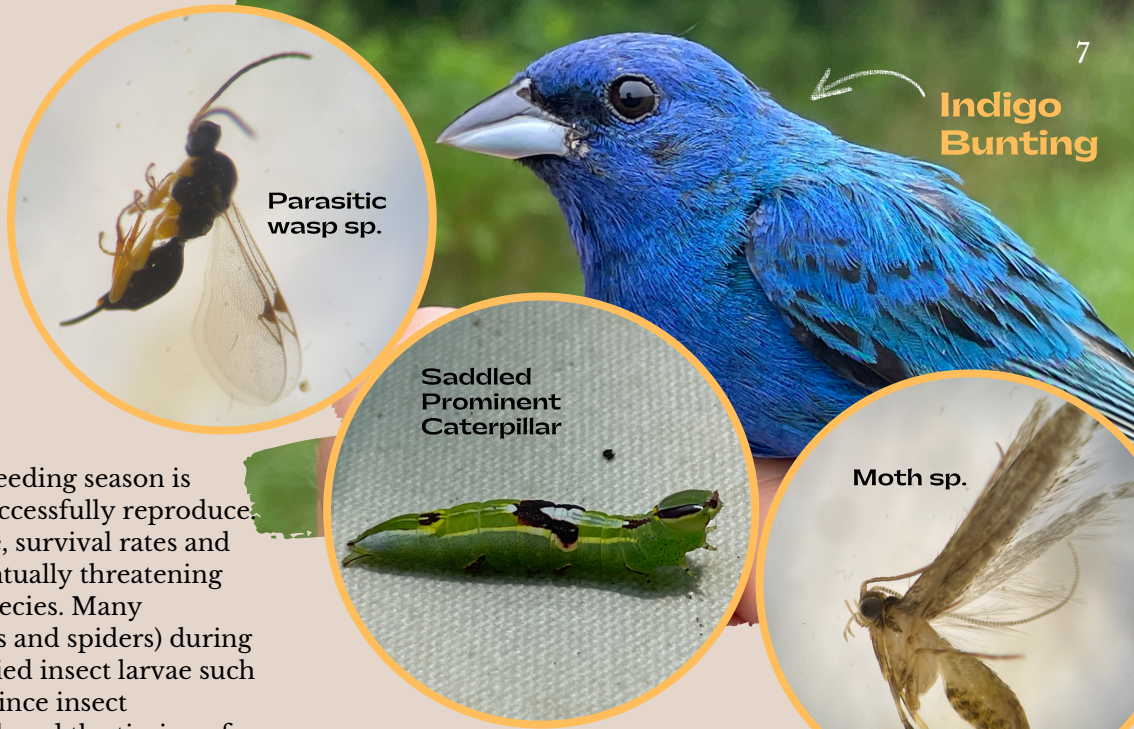
HBF's GIA program allowed Whitenack to start a *Caterpillars Count!* sampling program at HBS & other BRBO MAPS sites with the intention of establishing permanent study plots. Longitudinal data will be critical for understanding climate change effects on our WNC ecosystems. HBS & BRBO plan to carry on this project in the future so that we can better understand food resource availability & songbird breeding success in the southern Appalachians.

BRBO captured & collected data on 615 birds at their four MAPS locations this summer (Table 1). Most of the species caught rely on insects & spiders as an important food source during breeding season.

Table 1

Table 1. Blue Ridge Bird Observatory 2021 MAPS Banding Totals.

Site	Total Birds	Species Count	Warbler Species	Resident Species
Big Bald Banding Station	132	23	7	5
Cowee MAPS Site	116	28	5	12
Highlands Biological Station	148	28	9	12
Kituah MAPS Site	219	25	8	10

Figure 1

Arthropod Group: Ants; Aphids and Psyllids; Bees, Wasps, Sawflies; Beetles; Butterflies and Moths; Caterpillars; Daddy Longlegs; Flies; Grasshoppers and Crickets; Leaf Hoppers and Cicadas; Other; Spiders; True Bugs; Unidentified