Analyzing the NABA Butterfly Count Data

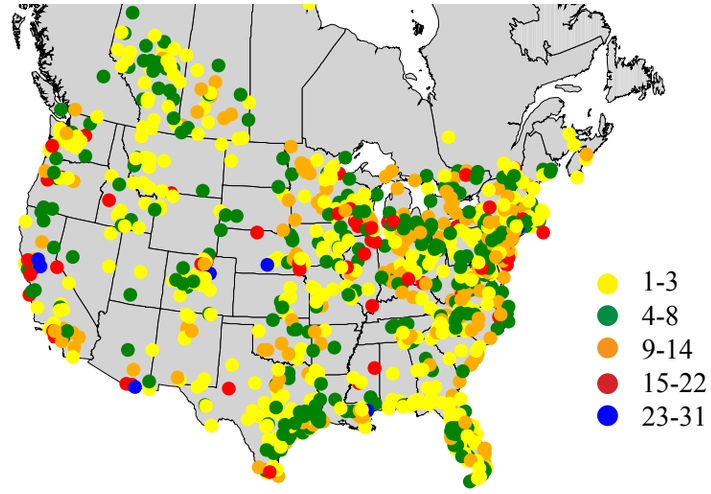
by Leslie Ries

The NABA Butterfly Count Program, including the 4th of July, 1st of July and 16th of Sept. Counts, is the largest butterfly monitoring program in existence in terms of geographic scope. Despite this, there has been little analysis of this treasure trove of data that has been collected throughout the United States and Canada over the past 31 years. Several papers on Monarchs and accounts of species richness patterns have been published using 4th of July data, as well as regular updates of trends by Ann Swengel in this magazine. However, this represents only a small portion of the total data set and potential of this remarkable program. I have recently begun a post-doctoral fellowship at the University of Maryland to compile all the Butterfly Count data into a database and conduct several large-scale analyses of trends in population size and community structure. I have spent the last year compiling the data and will spend the next two years analyzing the data. I will be updating NABA members on the project's progress and any interesting results from time to time.

One of the most exciting things about the 4th of July data set is how extensive it is. The program began in 1975 (initiated by the Xerces Society) with surveys conducted at only 28 sites. By the time NABA took over the program in 1993, there were surveys being conducted at 150 sites. Over the next 15 years, the program continued to grow, with the number of surveys leveling off at around 450 per year in 2000. Through the 2005 summer season, 6,199 surveys have been conducted at 1,027 unique sites in the United States and Canada (Fig. 1). (Surveys have also been conducted in Mexico, but I am not currently working with those data.) Although many sites are abandoned after only a few surveys (or even one), there are over 200 sites with at least 10 years of data and almost 30 sites with at least 20 years of data (note color-coding of circles on map). These sites with long-term monitoring records are often the most valuable for analysis.

Throughout this data set, there is a tremendous amount of information on many of the approximately 720 species recorded from North America. In fact, 564 unique species have been identified throughout the history of the count (see Table 1 for the top ten species). Of course, not all species are easily identifiable, with skippers being the most difficult. Although 97.5% of all observations are identified to species, there are many unknowns and certainly some misidentifications as well. To ensure the highest data accuracy, one of the first analyses I will do is to compare 4th of July data to two state-wide monitoring projects (in Illinois and Ohio) to determine how closely year-to-year trends mirror each other. This will give a sense of which species have the most reliable data. So far, I have only looked at data for the Monarch (admittedly, one of the most easily detectable and identifiable species) — but the results are encouraging, with year-to-year trends in numbers being highly correlated between all three programs.

I have several other large-scale analyses planned. First, of all, I plan to look for regional declines or increases for all species where we have sufficient and rigorous data. I'll also see if the data provide evidence of range changes (northward expansions might be due to global warming) or evidence that local land use changes impact regional butterfly numbers and community structure. These basic analyses will be important for the general conservation community as we continue to assess how human activity impacts the natural world. There have been several



Survey locations in the lower 48 U.S. states and Canada (surveys in Alaska, extreme northern Canada and Hawaii are not shown). The color of the circle indicates how many years that survey was active.

of these types of analyses that have come out of the large-scale British Butterfly Monitoring System which have been widely reported (many species are declining and/or moving northward). It will be interested to see if those trends also are found for North American butterflies.

There are several other projects that I have undertaken in collaborations with other researchers. One project I am currently working on in with Lincoln Brower and Doug Taron (of the Illinois Butterfly Monitoring Program) compares Monarch population levels in North America to the overwintering populations in Mexico. Our early results suggest that breeding populations in North America are able to quickly recover (within one season) from even catastrophic losses in Mexico.

Another project is to assess how the Northern Atlantic Oscillation (which causes predictable cycles in climate patterns) influences East Coast butterflies. My colleague on that project has found a strong link between this weather pattern and populations of several species of British butterflies.

I've also been working with another colleague at the University of Maryland to determine how the distribution of Pipevine Swallowtails influences the position of the hybrid zone between subspecies of the Red-spotted Admiral, the Red-spotted Purple (which mimics the Pipevine) and the non-mimetic northern sub-species, the White Admiral. Our initial results show that the latitude where Pipevine Swallowtail numbers drop to nearly zero (relative to Red-spotted Purples) is the same latitude at which Red-spotted Purples begin to transition to White Admirals, which offers evidence for mimicry-based selection.

Ultimately, there are many ways to use these data. I am excited to work with this data set and establish more collaborations. I'm also interested to hear your ideas about trends that may be worthwhile to look for. My hope is that as the count data become more widely used, the program will gain even greater prominence. As participation increases, the possibilities to learn more about North American butterfly populations will only grow.

The top 10 species based on the percent of surveys that included at least one observation of that species.

Butterfly	*Percent surveys present*
Cabbage White	*72*
Orange Sulphur	*66*
Monarch	*65*
Clouded Sulphur	*59*
Pearl Crescent	*59*
Red Admiral	*57*
Silver-spotted Skipper	*55*
Red-spotted Admiral	*54*
Spring Azure	*53*
Eastern Tiger Swallowtail	*53*