

NABA Butterfly Count Column

Are Butterflies Declining in North America?

by Leslie Ries

Butterfly declines have been well-documented in Europe — but are they declining in North America? There is probably no question of greater importance that could be addressed using NABA's count data. But even with 30-plus years of data, this is no easy question to address. The short answer is that I'm still not sure, but so far I have found no statistically significant patterns of large-scale, long-term declines in the overall number of butterflies. Indeed, there is stronger evidence for some regional increases in butterfly numbers. However, I have seen some trends that may indicate declines, and I will be exploring these in more detail in the future.

In working on these analyses, I have found that the unstructured monitoring protocol of NABA counts demands more sophisticated modeling than I have done to date. I'll be working on these new methods, called hierarchical, Bayesian models, that are better able to take into account the variable effort and non-randomized survey locations inherent in these types of surveys. These future analyses may be more illuminating about possible regional declines. Despite this, I think the patterns that I have seen so far are a good indication of the "big picture" — so I'll describe the results of my preliminary analyses.

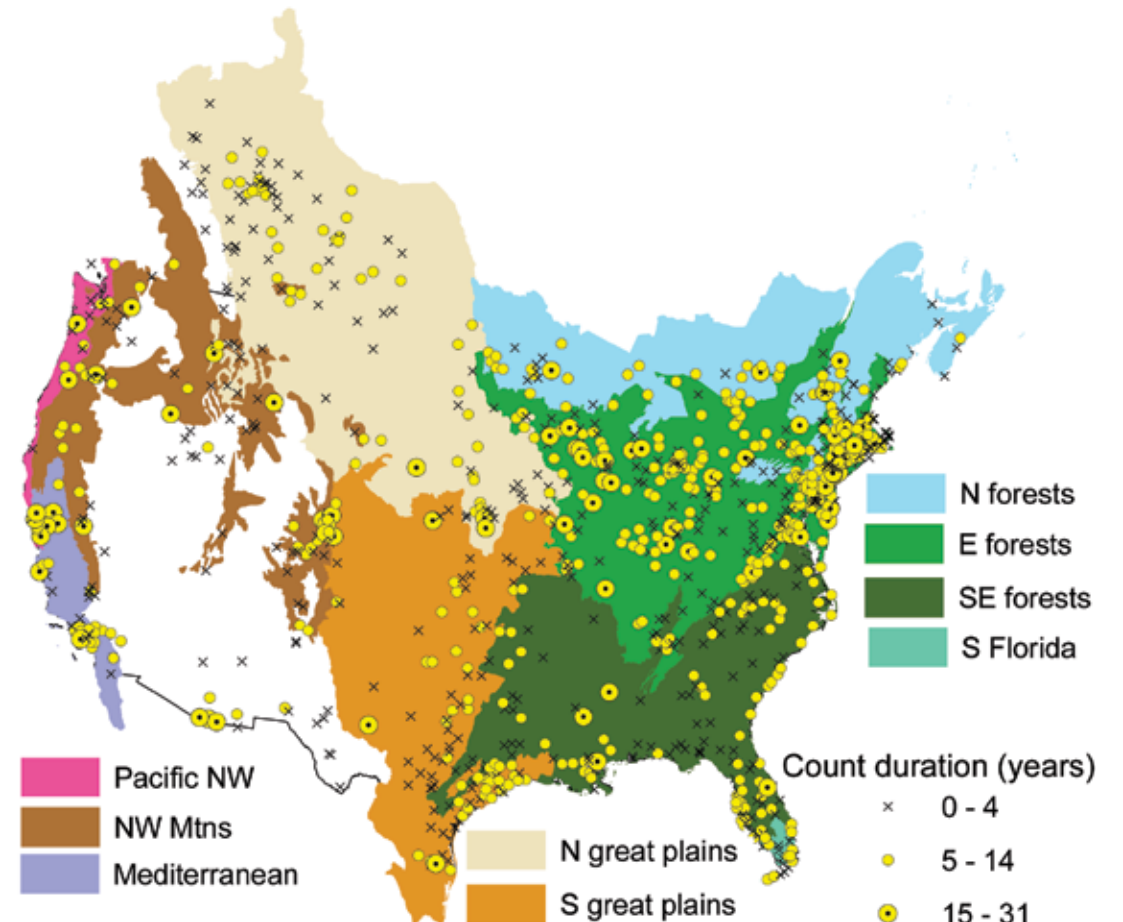
In order to look for evidence of large-scale, long-term declines, I divided the country into several regions based on similar ecotypes (at a very large scale). These regions are shown on page 39. NABA count locations are also shown on this map. For analyses, I only used surveys with at least 5 years of data (yellow points), and I paid special attention to surveys with at least 15 years of data (larger yellow points with black center). A couple of regions (Intermountain West and deserts) had so few surveys, that I was unable to complete any analyses. I encourage any readers in these regions to start a count (or several) in your area!

For each region where I completed an analysis, a graph showing the log-transformed total number

of butterflies (corrected by the total number of party hours) for each year is shown on page 40. These totals are log-transformed, so a value of "1" means that 10 total butterflies were seen, on average, during each party hour and "2" means that 100 butterflies were seen during each party hour. Only two regions, N Forests and S Florida, showed any statistically significant trends, and these were increases! Butterfly numbers in the S Great Plains seem to be trending downwards, but this was not significant. I've also seen evidence from some of my other analyses that suggests declines in the West, although these declines weren't picked up by this analysis. Future modeling work may be able to more strongly establish these and other patterns, so stay tuned.

These analyses were based on a pooling of all eligible surveys within a very large area. But what if we just look at individual surveys? Do any patterns emerge there? As of 2006 (the last year's data that are included), there are 99 counts that had been conducted for over 15 years. That seems like a lot (it is a lot!). But spread over the entire North American continent, it is still very sparse (see map on page 40). However, looking at those 99 surveys, we see that most show no trends at all (black circles), but that some do indicate either steady increases (green circles) or declines (red circles). No strong patterns emerge from these surveys at this time. But the good news is that as the popularity of these counts continues to grow, it won't be long before we have 200 or even 300 surveys with at least 15 years of data. I encourage everyone who has started a count to keep at it. The longer the data set from a single count site, the more valuable are those data!

Another critical measure of the butterfly community is the number of species. Indeed, butterfly numbers can easily go up while overall diversity declines. Imagine the worst-case scenario of our native species being replaced by swarms of Cabbage Whites and European Skippers! Unfortunately, for counts such as these, diversity



is one of the hardest factors to measure. This is because measures of diversity are linked so tightly to both the effort and experience of the volunteers. As each count continues from year to year, it tends to attract more people (thus increasing effort) and the people on the count tend to gain experience (they learn all the best places in their count circle to find each species). Clearly, diversity will tend to creep up year after year based on effort and experience alone. As was expected, and even with a measure that is able to control for effort (I'm not sure of any way to control statistically for experience), diversity measures increased for most counts where a trend was seen. Some counts did show long-term declines in diversity and these patterns are much less likely to be caused by an artifact of sampling.

Finally, what is happening to the individual species? Are any showing regional or even

continental declines or increases? I'll return to that question in a future column. In the meantime, I welcome any comments from long-time butterfly watchers. Have you noticed general increases or decreases in your area? Are there particular species that seem to be appearing more commonly, or were once common and now no longer around? Please contact me and let me know what you've been seeing. If any trends emerge, I'll report those in future columns, and compare those observations to what we see in the data.

TO ORDER THE COUNT REPORT
Price for the 2008 report is \$10 (NABA members) or \$15 (non-members). Send your check or money order payable to NABA (in U.S. dollars) to: NABA Butterfly Count, 4 Delaware Road, Morristown, NJ 07960 USA. For more information, visit www.naba.org.