

Conservation Matters:

Contributions from the Conservation Committee

An Essay to the Future

John Shuey

Indiana Office of the Nature Conservancy jshuey@tnc.org

I often tell students across Indiana that they will live through the most interesting of times. My own generation will apply the finishing touches to actions that will shape and mold future society – the future they will inhabit. The Greeks laid the foundations of Western Culture. The Han Dynasty underpinned much of the East. Mesoamerica gave us maize, tomatoes and potatoes – staples of the world. Every culture contributed wonderful religious traditions and beliefs that enrich our lives. Einstein, Darwin and Wallace gave us the conceptual tools required to understand the modern Universe and our place within it. But today, our collective actions may dwarf those contributions of the past. Through over-population, consumerism and commitment to short-term economic gains, I and my merry cohorts will help create an unstable climate that will rock the globe's ecosystems. This will be our historic contribution to our descendants – a century which may indeed be interesting, but to the world itself, not as much. Evolutionarily lineages will be irreversibly lost as our legacy ripples across the planet. Species we take for granted will struggle to find new niches. Entire communities may be lost. While people will certainly notice as the big cats vanish, the thousands, if not tens-of-thousands, of moths and butterflies likely to be lost will fly below the radar. They will become “collateral damage” as stressed ecosystems and societies adapt. Many species, representing unbroken threads reaching back through billions of years of evolutionary history, will be snuffed out like a cheap Dominican cigar on the fossil laden steps of my back porch.

Or not.... Certainly, we are all aware of the calls for reducing greenhouse gasses, and I won't devolve into a discussion of this issue. But instead, I'll bring this essay back to Lepidoptera, our common interest. As Astrid Caldas (in the previous essay in this column) noted, there are legitimate concerns about the perceived lack of research into the impact of climate change on Lepidoptera. The bulk of the emerging literature is a tribute to changing distributions – virtually all devoted to expansions while largely ignoring the more difficult to detect contractions that would also be expected. From a conservation perspective, these range contractions could provide important insights into the mechanisms of climate induced extinction, guiding the development of future conservation strategies. Or in some cases lack of range contractions may demonstrate ranges that were not limited by climate. While

Astrid is just too polite to say it out loud, her essay clearly points out our ignorance on the subject. Her point being that we need to address our short comings if we hope to make a difference.

Admittedly, I've never been one to allow ignorance to get in my way. I live in a state with shattered ecosystems, a tribute to Mesoamerican genetic engineering. In a fragmented landscape like this, site-based conservation is all about placing your bets for the future and, for the most part, letting them ride. Every park and nature reserve is a drawn out experiment that will potentially never end. Can a preserved habitat (we call them ecosystem remnants in the Corn Belt) hold onto its diversity for 20, 50 or 100 years? Think back to your understanding of island biogeography for insights, picture prairie remnants floating in a sea of maize and soya, and you are likely to intuit species declines, at least for the native species. Throw in climate change and the increased uncertainty can unhinge the pessimistic among us. In Indiana, I place most of our bets. But like my conservation counterparts everywhere, I try to cheat the system as best as possible using "best available science".

Conservation is an iterative and sequential exercise – a critical concept. With a few exceptions, we build today on the success of our predecessors, such as the professionals that protected the bulk of the remaining prairies in the Midwest and set them aside for the future. In the process, they conserved many of the finest locations for prairie lepidopterans in the country. But within 10-15 years of effort, they and others realized that these prairies were rapidly becoming shrublands and that prairie insects were often the first to succumb to reduced habitat size and quality. Aggressive prescribed fire was implemented to re-open habitat, further stressing insects. Later professionals scaled this management to provide refuge for fire sensitive species - a process still being refined. About 15 years ago, I helped initiate the first attempt to heal a Midwestern prairie landscape from an entomological perspective. It involved a local genotype mix of > 500 plant species seeded over 6,000+ acres designed to create expansion habitat around remnants and to re-build a larger grassland "island" of over 30 square miles. Today we ponder and implement strategies to increase ecological resilience in conservation areas by restoring complex hydrologic gradients, in part designed to address the predicted impact of climate change on these grassland mosaics. By removing agricultural drainage in adjacent fields we can retain more water as insurance against drought. At the other extreme, we are aggressively restoring the open drought-adapted oak barrens in these mosaics as "pre-adapted" species rich habitats that should thrive under future predicted climates in Indiana. And yes, butterflies and moths are used at these and a few other limited sites as tools to assess the success of these strategies. At some point in my life I'll move on, but the sequential process will proceed. My successors will adjust strategies accordingly as new insights are developed. Another critical concept that we must understand is that ignorance is a moving target. Even as we fill critical gaps in our knowledge, new questions will emerge. The one constant in conservation is the uncertainty of the future.

At some level, our charge as a (mostly middle-aged) organization is to leave something positive for the future. If I include my toes, I bet that I can count the entomologists like myself who have direct influence in land management decisions in the US. We are numerically swamped by botanists, fisheries biologists, herpetologists and ornithologists, and these ecologists routinely shape the future management of conservation areas that benefit their selected organisms of interest, often to the detriment of ours (not out of malice, but rather due to that ignorance thing). For example, those typical 30-50 plant species “prairie restorations” perform admirably for grassland birds, reptiles and mammals. Wetland restorations provide wonderful breeding habitat for amphibians even if dominated by invasive plants. For these vertebrates it’s all about “habitat structure” - not composition. But expanses of invasive species and low diversity restorations play little, if any, role in enhancing the diverse regional assemblages of host-specific lepidopteran communities. With just a few seats at the table, our influence on action is limited and strategies that maximize perceived conservation gains generally take insects for granted.

I’m not recommending that we all leave our jobs for careers at national parks or land trusts. Rather, that we strategically lend our expertise to the assessment and understanding of the effectiveness of the slow-motion conservation experiments that surround us. Unfortunately, we generally perceive that “Lepidoptera conservation” is focused on glamorous species in some distant location. The reality is that success hinges on the conservation of the “common” communities that literally surround us, especially as the future stresses of climate change unfold. For example, the rich mesic forests of glaciated Indiana support upwards of 2,000 species of Lepidoptera. Most of the small isolated woodlands (< 100 acres) of the Corn Belt are probably doomed to collapse from increased drought and invasive species over the next 50 years. In Indiana, we’ve moved our bets to just three larger glaciated forest sites that seem “defendable”, with the hope that these limited sites can carry the bulk of our mesic forest diversity into the future. It’s a bet we placed based on two factors; “best available science” masking ignorance, and the financial realities that limit the number of bets we can place. I would love to have some real insight beyond botany and neotropical migrant songbirds to adjust our decisions, but alas, I don’t. Across the globe and likely within a few miles of your home, people like me are making similar decisions which have great potential to conserve lepidopteran communities and there is a good chance that they are missing the mark.

Collectively, our membership possesses world-class expertise and insight that could help move the conservation bar forward. Astrid asked us very politely to engage in the process – I’m willing to beg! As a rule, scientists and lepidopterists are cautious people, never prone to making ungrounded recommendations. That innate caution, that we are never absolutely sure “that *(insert your recommendation here)* is a good conservation strategy” inhibits our ability to influence the future. Climate change is upon us now. It is not some abstractly interesting process of the future. Trust me, you can provide best available science if you are inclined. Your field observations,

data, ideas, and insights all trump my ignorance. After 18 years in this business, I think I can speak for my counterparts across the US in encouraging your engagement. They cringe when I talk of ignorance, but they know what I mean. So much of conservation around the world— the real stuff where land is set aside and managed - flies by the seat of our collective pants!

The most interesting of times. Many of you have met Ryan, my eleven year old son, at our annual meetings. He's an awesomely mature kid, and over the years, I've had many "talks" with him about grown-up stuff. But the one discussion that I've avoided is my "you *will live through the most interesting of times*" talk. Personally, it is too painful and personal a subject for me to discuss with someone for whom I bear so much responsibility. I'm hoping for a day when I believe that the future world will offer more than just interesting times. Perhaps interesting plants and animals will endure as well. Someday soon, I'm hoping to glimpse a light at the end of this particular tunnel. And I'm trusting that some of you will provide some of the flashlights we'll need to push through it. Then perhaps I can have "the talk" and explain how we are trying our best to fix the things we broke.