On a pleasantly warm and sunny day with a remarkably light breeze, my husband Scott and I walked the slopes of Hole-in-the-Mountain Prairie in southwestern Minnesota. Of the dozen Ottoe Skippers, one male departed its pale purple coneflower to chase a lone female Dakota Skipper straggling at the end of that species’ flight period. Several dozen Arogos Skippers (the midwestern ‘Iowa’ subspecies) were nectaring on coneflowers too. Hundreds of Regal Fritillaries, both males and females, chased about in their characteristic frenzy. Although the date (July 16, 1990) was very late in the flight of Poweshiek Skipperling, over a dozen nectared on coneflowers and lobelias and fluttered low through the grasses, flashing black above and silver-gray below. Although the easiest of the mid-summer prairie skippers to find (both in number of sites and number of individuals), the Poweshiek, with its distinctive whirring flight, is still my favorite, the memory of 245 individuals (seemingly one or more on every coneflower) in a single part of this same prairie still fresh in my mind from June 30, 1989.

The quintessential tallgrass prairie skipper, Poweshiek Skipperling inhabits the full range of prairie vegetation types from lowland (wet) to upland (dry). It is often found near wetlands and in rolling topography, and is possibly more restricted to moister prairie types at the western edge of its range. At the eastern extreme of its range, this skipper is known from sedgy meadows and fen wetlands in Michigan. The main adult flight period is typically in late June to mid-July, with winter passed as a partially grown caterpillar. Documentations of egg-laying sites and caterpillar foodplants are relatively few: wetland species like spike-rush (Michigan) and sedges (Dakotas), as well as dominant prairie grasses: Indian grass in the wild and big bluestem in the lab (Iowa) and prairie dropseed and little bluestem (Wisconsin). By far the highest densities of this species occur in upland prairie, but that upland prairie is typically adjacent to lowland prairie and even wetlands. However, Poweshieks also occur in lowland prairie that has no upland prairie in the habitat patch.

Many mysteries remain. Is the Michigan habitat (wetlands) an outlier, or just what’s left there of a more continuous occupation of wet to dry prairie seen farther west? Poweshieks appear disinclined to disperse far, suggesting that caterpillar rearing areas would not be far away from areas used by adults. So do Poweshieks successfully breed in both upland and lowland, as the smattering of egg and caterpillar plant observations suggest? Then is the benefit of “up-low” (my term for the presence of both upland and lowland grassland of any type in a habitat patch) about varying success of this breeding in up vs. low among years of major climatic differences (hot vs. cool and wet vs. dry years)? What are the limiting factors on its curious and narrow range? What makes it possible for this species to attain amazing densities, and therefore dramatic fluctuations in abundance? There is much yet to learn, but will we be able to?

Poweshiek Skipperling has experienced tremendous decline in the last two centuries, and this continues up to today.
and this continues up to today. Of course, the vast destruction of tallgrass prairie (99% or more in most states) for agricultural use was catastrophic for prairie skippers. Numerous threats such as plowing, prolonged heavy grazing, frequent mowings, quarrying, suburban sprawl, and so on beset prairie habitat in the unpreserved landscape. But in the last half century, thousands of acres of never-tilled prairie with wonderful flora supporting large Poweshiek populations have been protected. Many tracts amount to hundreds or even a thousand acres or more, and are managed for their natural value. Yet stunning Poweshiek declines have continued on these preserves for many years, or even decades, after the habitat was protected, and these dramatic declines continue up to the present. Since extirpation (extinction of a population) is hard to prove, I won’t use that term about Poweshiek here; instead I call a population “subdetectable” when it goes from reliably findable to only erratic hit and miss records, if found at all.

This phenomenon is not new. Several decades ago, Jeremy Thomas reported that conservation actions to manage for more caterpillar foodplant led directly to the extinction of the Large Blue subspecies endemic to England. This butterfly had an obligatory relationship to a particular ant species that required a relatively sparse vegetative structure. When the ant disappeared, and it did so even when the vegetation had only subtly altered, so did the butterfly. Subsequently, Martin Warren’s landmark analysis in the early 1990s documented losses of vulnerable butterfly populations just as great on protected as on unprotected land in central southern England. These British results have been dismissed as consequences of the highly altered and fragmented “semi-natural” habitats on this island long and densely populated by people, in contrast to our “natural” prairies not all that many years removed from when they existed undespooled. But in actuality, these British outcomes are apparently not due to a difference in landscape but instead only due to a difference in volume of data — decades and centuries of voluminous observation and compilation. Since our European colleagues have embraced their devastating conservation failures, they have been able to change course and help their particular butterflies and sites obtain better outcomes. Their relentless candor has also given us the opportunity to learn from their experiences.

In the spirit of this British precedent, I’d like to examine the numerous factors that help explain what makes Poweshiek populations tick, although it’s unclear we’ll ever decipher it all. But we do know a lot about what associates with bigger, stronger populations and conversely with smaller, more localized, and declining populations. While Poweshiek inhabits the full range of prairie vegetation (degraded, semi-degraded, and undegraded types of never-tilled prairie), its abundance is markedly higher in undegraded vegetation at topographically diverse sites that support both wet and dry grassland. Both subtle swales and rolling hills accomplish this. Large sites (75 or more acres) tend to have higher Poweshiek densities but this pattern is not as strong.

The factor affecting Poweshiek abundance that humans have the most control over, especially in preserves, is land use (management). After all, we can’t easily change the topography of a site from uniform to having “up-low” in a way that benefits Poweshieks. Patch size is likewise hard to improve, since prairie plantings in previously tilled fields are unlikely to be used much by Poweshieks. Management to improve vegetative quality (i.e., reduce non-native weeds) has, in my observation, rarely reduced these weeds substantially for the long term, and perversely, they may increase instead. Even more rarely have I seen the methods used to improve vegetative quality tolerated well by localized butterflies present at the site at the outset. We can’t even predict annual fluctuations in abundance (tell me now what the next season’s weather will be like), much less change Poweshiek responses to weather.

Stinson Prairie still harbors many beautiful wildflowers, but sadly Poweshiek Skipperlings have not been seen here in the recent past.

Top: An area of Stinson Prairie filled with leadplants (Amorpha canescens).
Bottom left: Wild onion (Allium stellatum).
Bottom right: Plains tickseed (Coreopsis tinctoria).
If you want to see a Poweshiek Skipperling, you should plan a visit to Midwestern prairies before it is too late. July 17, 2004. Puchyan Prairie SNA, Green Lake Co., WI.

Back in 1981, Tim McCabe insightfully wrote about two management issues related to prairie preservation that affect butterflies. First, the historical land usage (typically haying or light grazing) is usually stopped at the time of preservation. In areas where historical land management had been consistent for decades and where Poweshieks were still abundant at preservation, this strongly implies the compatibility of that previous land use with the butterfly. Second, a new management regime (especially fire), that had not previously been used in the area, is usually started. While effects of these changes may occur quickly, it could take years, even decades, for the full impact on butterflies from these changes in management to become fully apparent, especially if this new management is applied only to a portion of the habitat patch per year. He also noted, in the context of Dakota Skipper, that concentration areas for immature stages need to be protected from fire, and the locations of these concentration areas can vary among years within a site.

About a decade later, Tim Orwig and Dennis Schlicht wrote that prairie-obligate skippers are staggered in the timing of their life stages, so that no “safe” time exists when a fire can avoid incinerating immature skippers. Likewise, any management action (burning, mowing, haying, or grazing) can interfere with the availability of resources (possibly quite limited in location within a site) required at that time by the skippers, possibly in an immature life stage, and so should not be broadcast over most of the required patch in a given year. While many studies have demonstrated that mowing causes less insect mortality than fire, individual species may still be particularly vulnerable to this management as well. Thus, there is no management, or management timing, that is “safe” for all prairie species everywhere.

On that day when we recorded 245 Poweshieks in one part of Hole-in-the-Mountain Prairie, we then crossed a subtle vegetative line visible primarily through the disappearance of dead plant matter (litter) underfoot, signifying a management fire since the last growing season. While the vegetative composition remained similar, and we had seen numerous Poweshieks here the previous year, we recorded only one Poweshiek there that day, within one yard of that burn line, despite extensive walking amongst peak-flowering of abundant coneflowers. This experience turned out to be typical. Less than 1% of all the individuals we’ve recorded in our surveys were in areas in their first growing season after a fire, even though most sites we visited were preserves managed with fire on a rotation of about 3-6 years.

“Idling” (doing virtually nothing for many years) has consistently associated with the highest Poweshiek numbers. Furthermore, Poweshiek abundance also correlated positively with increasing years since any management action of any type. To the extent an area shows signs of brush or weeds increasing, Poweshieks fared better when this is addressed in very localized treatments such as mowing, brush-cutting, or spot-herbiciding only the problem plants. Rotational mowing (leaving the clippings lie) or haying (removing the clippings) in a single cutting of only part of the site in a given year, especially in late summer or early fall, also came out on top for Poweshiek, and was well favored by Dakota and Arogos Skippers and Regal Fritillary as well. Areas hayed annually fared more poorly for Poweshiek, and heavy grazing was also poor. Even moderate grazing hasn’t looked promising, which must nonetheless be reconciled somehow with the presence of large populations at the time of preservation on sites that had been previously grazed or hayed (usually annually) in an agricultural context.

After that first very low year following a fire, fire management has complex results for Poweshiek. In the next few years of the rotation, we recorded high densities at times. But those favorable outcomes were counterbalanced by as many examples where we never observed this rebound. Fire management may have a tipping point that divides these favorable and unfavorable outcomes. How many Poweshieks were killed in the fire? How many survived within recolonization distance? How many of those surviving immatures reached adulthood (depending on subsequent weather, for example)? How will future fires affect the progress of recovery from this fire? Preserves where fire management has been occurring and Poweshieks have still been reported in the last several years have some of these characteristics: largeness (100 or more acres), up-low, presence of wetland, more recent

Pages 20-21
Page 20 top: Cayler Prairie, Dickinson Co., IA, where Dakota Skipper made its last stand in Iowa, once held a large population of Poweshieks. None has been seen here for several years.
Page 20 bottom: Hayden Prairie, Howard Co., IA. Although numbers are very small (usual sighting is of one butterfly), Poweshieks have occasionally been seen here during the past 25 years.
Page 21 top: Haffner Prairie, Dickinson Co., IA once had a strong population of Poweshieks. None has been seen recently.
Page 21 bottom: Hoffman Prairie, Cerro Gordo Co., IA. This is the only Iowa prairie where Poweshieks are still fairly consistently seen, albeit in small numbers.
conservation (after 1985, vs. before), and/or not all of the habitat patch controlled by one agency or even preserved. Few sites have all these characteristics, but all sites known to me have at least two.

Perhaps Poweshiek declines seem most obvious within the last five years, since the species is now unfindable in many regions, even at many sites where it still occurred in good numbers a mere decade or so ago. Where the species is still reliably detectable, abundance is often much lower than in the 1990s. But actually this decline has been occurring for decades on conserved land. Until the species is subdetectable at most or all sites in a state, it is easy to assume that low or erratic observed numbers at some sites or in some years are due to survey timing in the flight period or weather or annual fluctuation or a temporary response to management. After all, Poweshieks do vary quite a bit in exactly when the right timing, and the main flight period is often brief. We saw hundreds in Minnesota on June 20-23, 1988, June 29-30, 1989, July 6-11, 1992, and July 4-6, 1994, vs. three on June 24-26, 1990 (too early), nineteen

Here are some prairie flowers to look for during your visit:

Above: Prairie smoke (Geum triflorum). June 1, 2008. Joachim Prairie, Chickasaw Co., IA.


Frank Olsen reports: When I was surveying the Dinesen Prairie in Shelby County Iowa on July 1, 2008 — and with my car parked 10 yards away from the only entrance to the site — the Shelby County conservation personnel showed up and started a prairie fire. I was on the north half of this 20-acre prairie, and they drove an ATV across the prairie from west to east, using a drip torch to start the prairie on fire. The wind was from the south. Just 10 minutes earlier I had photographed a western prairie fringed orchid on this same north half. The images show the orchids and a bit of the fire. Luckily I escaped unscathed, but the orchids were toast.

on July 16-20, 1990 (too late), and fourteen on July 8-12, 1991 (also too late). It’s also easy to blame weather, but we recorded dense numbers in sprinkles with a temperature in the low 70s. Warmth definitely improves results, but we recorded dense numbers in sprinkles with a temperature in the low 70s. Warmth definitely improves results, but we recorded dense numbers in sprinkles with a temperature in the low 70s.

The logic of the ecosystem approach to managing preserves is appealing. Plants, herbivores, and carnivores are all linked together, and not just the famous and charismatic but also the obscure and little known species deserve conservation. But because direct scientific observation does not exist for prairie ecosystems while they existed undegraded and unfragmented, we can only infer or extrapolate how they might once have looked and “worked”. Especially for invertebrates, their full range and occurrence, possibly even their existence, is unknown. How can we know that a particular ecosystem approach really is encompassing all species, or doing so the best way?

An alternative approach focuses on the big picture — whole ecosystems and their natural processes, with fire appearing much more natural than cows and haying machines. As one manager told me in the early 1990s, “We restore natural [prescribed] fires, and whatever results is what should be there.”

An alternative point of view is that it now impossible for natural processes to restore the prairie ecosystem, because it is too fragmented and degraded. Instead, in today’s landscape, consistency of habitat condition and unintrusive management are significantly more favorable for specialist and localized species, while dramatic changes (“disturbances” such as fire or other events that clear out most plant litter and bare the soil) favor generalist and opportunistic species, both native and alien, both plant (herbaceous and woody) and animal. The “right” management is not defined by ecological theory but rather by specific results of particular species. The definition of “natural” in this case is not whether the management action itself looks natural, but whether favorable outcomes for nature occur.

I don’t see how to reconcile these two views. At the biennial prairie conference in the early 1990s, when I stated that fire should be the least used major management tool in prairie, the audience gasped. Perhaps you are too. (The conference editorial committee apparently delayed their gasp. The paper I submitted to the conference proceedings was accepted, then de-accepted for publication without explanation. Most of that manuscript has since been published in other scientific forums.) Prairie butterfly declines since then have only increased my confidence in that statement.

Frankly, I don’t want to reconcile these disparate approaches. Let’s disagree more, so that different sites (and different parts of the same site) would distinctly differ in management, and therefore in biodiversity being successfully conserved. I’ve been
very grateful whenever I’ve found grasslands being conserved with a management approach different from the mainstream. These sites are where I’ve learned the most.

Is it reasonable to expect more favorable outcomes in an ecosystem as decimated as tallgrass prairie? Yes, I think it is. Wonderful conservation successes for butterflies have occurred not only in Europe but also here in North America, and for some very localized species in very fragmented habitats. These documented successes in butterfly conservation management usually arise out of management specifically designed for individual species, such as Schaus’ Swallowtail and El Segundo Blue (see American Butterflies volume 13 number 1) and Swamp Metalmark (volume 13 number 2). Less often, an “umbrella species”, such as the Greater Prairie-Chicken, has been successfully conserved, and this “covered” the conservation needs of a localized butterfly, e.g., the Regal Fritillary (volume 13 number 1). Suites of co-occurring butterflies can also be helped simultaneously (volume 13 number 1).

Wouldn’t a switch from an ecosystem approach to species-specific management cost more? No, it can cost less. Management other than fire that accomplish conservation likely won’t be profit-making; why should we expect them to be? But conservation-style haying and grazing can at least partially pay for themselves through sale of the rights to local farmers. This can also build cooperative relationships between conservation and agricultural interests, an intangible but nonetheless useful benefit to biodiversity. Actually, mowing and spot-herbiciding are nonetheless useful benefit to biodiversity. Much research is performed at the family scale, so that species-specific patterns cannot be discerned and the main results reflect those of dominant species, which often aren’t the species most specialized to a habitat or most in need of conservation. Even in large high-quality prairies, specialist butterflies will be only a minority of the species, and often of individuals, present. Many insect studies examine “diversity” (how many species are present).

This presence/absence approach is much weaker at detecting trends than abundance assessments; if a species declines 99% at a site, but is still present, this trend is not detected, only when it’s too late at the site (the species disappears) does this change register, and only if it disappears at a lot of sites does this become accepted as a non-random pattern.

Before a researcher comes along, many prairie sites will have lost most of their prairie-specialized species, and not necessarily due to fire or other management, but due to vegetative change, or smallness or isolation of the site. Studies there can’t teach us about prairie-specialist insects. Studies may use tiny experimental plots (10 or 20 or 50 square meters), which affect butterfly populations differently than the larger plot size at which most managements are usually experienced by butterfly populations.

Fluctuations in insect abundance in a given year, and quirks of vegetation and topography at a single site, can often mask or confound more general patterns in short-term studies. Only through careful monitoring of specific species at many sites over many years do patterns become clear.

Are butterfly responses out of whack with the other prairie species, plant and animal? No. They’re just one of the more sensitive groups that’s well enough studied to allow assessment of trend. Actually, some groups are even more sensitive to fire, as Jeff Nekola has demonstrated for the inconspicuous set of land snails specific to grasslands. British analyses have demonstrated that butterflies are surprisingly effective indicators of change in many other insect groups, and have experienced greater declines than birds, which have in turn declined more than plants. This makes butterflies particularly useful as an early and authoritative warning system. Lovers of prairie birds and plants, take heed.

Interstate Highway 80 bisects Iowa right through Poweshiek County, where Parker described Poweshiek Skipperling as a species in 1870. The skipper hasn’t been found there since. As you drive, you’ll experience the up-low topography favored by this species but no longer inhabited by it. However, this species was rediscovered in Wisconsin in 1978, after seventy-plus years of no records. While known Poweshiek sites in Wisconsin remain very few and are highly vulnerable, the species still exists here. Conversely, the widespread plague of Poweshieks to subdetectable levels has been particularly well documented in the last five years in Iowa. What a remarkable reversal of fortune that Poweshiek is now...
Ranges of Poweshiek Skipperlings
Areas where Poweshiek Skipperlings are believed to still occur are shown in orange. Areas where they once occurred but are now not seen are shown in red. The “driftless area” is shown in purple. The green line is the border between tall-grass prairie (to the west) and eastern woodland (to the east). The blue line is the border between tall-grass prairie (to the east) and mixed grass prairie (to the west).

Document butterfly observations by date and site with photos, sketches, and/or field notes describing them. Record all species always. Enumerate how many you see. Quantify your survey effort (e.g., start and end times, distance walked) and weather conditions. Follow established routes within a site. Resurvey regularly. Segment your route by vegetative and management differences, and record your butterfly observations separately for each segment.

Pool your observations: While I am sharing my personal observations in this article (through 2007, Scott and I have recorded Poweshiek in four states, and observed Poweshiek sites outside the flight period in South Dakota and Manitoba, having missed only Michigan sites of the populations still extant), even more am I drawing on a vast amount of work by lepidopterists too numerous to name. You can share your observations by participating in NABA’s Butterfly Count program, Butterflies I’ve Seen website, and local chapters.

Analyze the data: While some patterns may be pretty obvious, others only reveal themselves with careful examination of the data. This is time-consuming and painstaking (many factors affect butterfly occurrence and abundance), but this step is essential for understanding what helps and detecting declines while time still remains to do something about them. Be dazzled but undeceived by the highs; instead, be alert for how low they can go. The greater the volatility in numbers (as with Poweshiek), the more chance for loss in unfavorable years.

Advocate for butterflies: Share your interest in butterflies and what you’ve observed with land managers in your area, and listen to their knowledge and perspective. Also inform relevant state, provincial, and national agencies that you care about butterflies outside your local area, such as Poweshiek Skipperling. Contribute comments during the official period that federal and some states’ regulations designate before finalizing their implementation, including those affecting endangered species. Write to your legislators. Attend hearings.

RANGE
The range of Poweshiek Skipperlings shown on page 30 is based upon accepted records, especially as found in state and provincial field guides and scientific articles.

Except for Michigan, this range is approximately bounded on the east and north by the border between tallgrass prairie and eastern/northern forest, an important climatic gradient unusual for its generally southeast to northwest directionality. The western boundary closely approximates the transition from tallgrass to mixed-grass prairie.

The natural vegetation of central North America is dominated by grasses and wildflowers, typically classified into three regions (tallgrass, mixed-grass, and shortgrass) that reflect a primarily east-west gradient in annual precipitation. Tallgrass prairie extends much farther south than Poweshiek’s range. Do climatic factors limit Poweshiek’s southern range, and if so, how? Furthermore, the southern tier of Poweshiek’s known range contains only old records. Is this due only to greater and earlier habitat loss, as this is some of the most productive farm land in the world, or also due to a northward shift in a climatic limitation on Poweshiek’s range?

The known range contains a number of interesting gaps, some or all of which could be due to habitat destruction before any record was obtained. But it poses some interesting questions, too. In Manitoba and northeastern North Dakota, Poweshiek records don’t reach quite as far west as the easternmost extent of mixed-grass prairie, while in southeastern North Dakota and northwestern South Dakota, Poweshiek extends farther west than tallgrass prairie.

No confirmed records (known to me) occur in the “Driftless Area” (an area lacking glacial depositions of “drift” or debris, primarily in southwestern Wisconsin as well as immediately bordering parts of Illinois, Iowa, and Minnesota). In the last Ice Age, this area was entirely surrounded by glaciation but not overtopped by it. Is the rougher, steeper terrain in this region unfavorable for Poweshieks, perhaps by allowing too much forest in floodplains and north-facing slopes?

A remarkable paucity of Poweshiek records also occurs in the eastern and central portions of the southern tier of Minnesota counties.
IDENTIFICATION

Poweshiek Skipperling is distinctive for being predominately dark above, pale gray below with white vein scaling, relatively elongate and rounded in shape, and often flying relatively slowly (for a skipper) low in the grass. By far the most similar species in range is the closely related Garita Skipperling. But a few other skippers overlap with Poweshiek and can superficially resemble it.

A little bit smaller, Least Skipper is similar in flight habit. The forewing (FW), both above and below, is remarkably similar both in amount of dark area and location of orange, although the orange is more extensive on the margin (“outer margin”) below. However, the Least’s hindwing (HW) is predominantly orange (not dark above and not silvery or gray below). Least, more so with some fading, can give the impression of lighter veins on the hindwing below. European Skippers also have a relatively weak flight, but have much more orange on all wings and a more triangular shape. However, faded individuals can give a sense of striations on the HW.

Definitely not a flutterer and restricted to wetlands (although sometimes found slightly more upland at nectar), Two-spotted Skippers can be distinguished in that on the FW above males have a stigma (black line in the middle of the wing, surrounded by a bit of orange) and females have a few white or creamy spots. The HW below has light striations on the veins, like Poweshieks, but the background color is orangish, orange-brown, or tan-brown. While Poweshieks can also have a bit of an orangish cast on the HW (which may be reflectance from the flower it’s nectaring on), the background still has a grayish or silvery cast too. Two-spotted Skippers have a distinctive white fringe on the trailing margin of the HW, while Poweshieks have an extensive black stripe there (discussed below).

A more western species, Garita Skipperling overlaps with Poweshiek’s range in Manitoba, North Dakota, and far northwestern Minnesota, with Garita also recorded in one disjointed area of Ontario. This raises another interesting question: did (does?) Poweshiek also occur farther east than currently known? The Garita flight period is offset about 1-2 weeks earlier. Both species have the distinctive white scaling on the veins of the HW below. Garita is smaller and more likely to be in drier, shorter grassland. The most obvious difference is the background color of the HW below. In Poweshiek, this is usually charcoal (ignoring the pale white overscaling that is prominent on the veins but also more sparsely occurring elsewhere, leading to an overall impression of gray). On Garita, this is usually orange. There is potential for variation — something of an orangish cast to Poweshiek and a darkish cast to some Garitas (perhaps more so when faded).

But three characters are definitive for distinguishing Poweshiek and Garita. First, Poweshiek has a relatively large black stripe near the trailing margin of the HW, on the “inner marginal fold” but often not visible or only barely so when observed live. However, what is missed in live observation can often be detected, even as the slightest stripe, in photographs. Garita is orange there. Second, on Poweshiek’s FW below, away from the costal and outer margins, on the inner area of the FW, the background color is dark. On Garita, this is orange. This inner area can only be seen in the field if the FW is not tucked all the way under the HW. Third, on the costal margin of the FW, particularly on the topside, Poweshiek is orange, in contrast to the darker area farther out on the the remainder of the FW below. Garita shows a relatively uniform orange or mottled orange-dark color over the entire costal margin and FW generally. This pattern on the costal margin is subtler below, but may show some value for identification too. If present, another character distinguishes Poweshiek: black on the outer fringe of the HW vs. more uniformly white on Garita. But this only applies to fresh Poweshiek individuals — the black edges may wear off. All of these characters can be seen for both species in Jeff Glassberg’s Butterflies Through Binoculars: The East.