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Butterfly Conservation Management in Midwestern Open Habitats

Part 7: Plantings (habitat creation)

by Ann B. Swengel

This chapter is about the concept of "starting over" in a habitat patch—scrapping the existing habitat and creating a new vegetation (prairie or savanna) in its place. One option is to maintain it approximately as is (retention). But another goal may be to improve (or "restore") the native quality of the site by reducing the non-native flora, increasing the extent and abundance of the native flora, and possibly changing the vegetative structure (e.g., reducing brush in prairie), so that native biodiversity (both plant and animal) benefits. It is difficult enough to maintain and restore native plants, but even more difficult to do so in ways that retain the butterfly fauna, much less improve it. As a result, my preceding articles are long! However, there is also the option of starting over. This means making no effort to retain what's on that patch of ground now. In fact, the goal is usually to get rid of all the existing plants to the extent possible and replace them with a new flora. But this option also means eliminating the butterflies there now.

From the point of view of butterflies, habitat creation is fraught with hopeful possibility. There is definitely room for habitat creation to improve the situation for butterflies by increasing the area and quality of vegetation usable by them in the landscape. A lawn or plowed field is very poor in number and abundance of butterfly species. Effective habitat creation on such a site establishes a variety of native plants, which can in turn support a greater variety of butterflies. Of course, most of these butterflies are relatively flexible in their habitat requirements—generalists, in other words. However, in the most biologically impoverished parts of our midwestern landscape, establishing a generalist butterfly fauna, and increasing its diversity and abundance, is a significant improvement in the area's biodiversity. Some generalist species may be of local or regional interest, too, due to range expansion (meaning the generalist is an interesting newcomer to the area) or range contraction

(what was once a common species has become harder to find in the area). Plus some habitat creations also support some more localized butterflies, even some specialists such as the federally endangered 'Karner' Melissa Blue in lupine plantings.

But habitat creation also has an extensive record of unintended and undesirable consequences. I view habitat creation as the riskiest approach to butterfly conservation. A planting is much more expensive than maintenance or even improvement of existing habitat, and so habitat creation is more likely to fail a cost-benefit test. Independent of cost, some habitat creations have been so unsuccessful that they are worse than what was there before, in my estimation. Sometimes this may be true just from the point of view of butterflies, but sometimes it may be worse for plants as well as butterflies. So this chapter is about the many pitfalls and obstacles to successful habitat creation. I want to use those lessons from past projects to indicate when habitat creation is and isn't appropriate, and how to make habitat creation more useful for more butterflies.

PRINCIPLES

Plants do not cause butterflies. Compatible, consistent long-term landscape conditions cause both plants and butterflies to exist together. Now you might say, "Stop right there, Swengel. My yard used to be all lawn but then I planted caterpillar food plants, and I got more butterflies. So my plants caused more butterflies. And the more native plants, the better the butterflies!" Well, my husband Scott Swengel and I have also done butterfly gardening, and as a result, we've found all life stages of Black Swallowtails and Monarchs in our garden. For a tiny urban lot, the several dozen butterfly species we've recorded here isn't too shabby, and some of these butterflies have been a surprise, such as Silvery Checkerspot. Few, however, appear able to exist as a population entirely limited to the resources in our yard. Plus we've planted red

cedars in honor of Juniper Hairstreak and pipevines for the Pipevine Swallowtail other Wisconsinites have successfully attracted to their gardens. But we've seen neither in or near our yard.

It's the habitat consistency, or lack of it, in and around the site that largely determines what butterflies do or don't reach my yard, or a planted prairie, or a restored ecosystem.

Even the wide-ranging, migratory Monarch reaches and benefits from my garden because habitats elsewhere have existed consistently enough in enough places when and where the Monarch needed them so that the Monarch continued to exist to find its way here. Most butterflies that reach a habitat come from much nearer than Monarchs may. It's the habitat context in the landscape immediately surrounding your site (within about a half mile or mile) that supplies most of the butterfly species that will use a habitat creation. From the scientific literature, it appears that the upward limit for most resident (non-migratory) butterflies to disperse in from the nearest breeding area is about ten miles. Remember, you are deliberately inserting the plants in your site but are counting on the animals to find their way there on their own. The ones most likely to get there are from nearby.

As a result, the highest priority is always to protect those existing habitats that serve as reservoirs (sources) of animals. However, those reservoirs do not always last forever. Habitat destruction and degradation strike some of them, causing butterfly decline and loss in them. Thus, it's useful to coax butterflies to establish additional populations in our habitat creations, outside those reservoirs we see existing now. Our gardens and plantings may need to replace natural habitat reservoirs lost in the future, if those butterflies are to continue to exist in the area. Hopefully, your habitat creation will become a reservoir for butterfly biodiversity in your area.

The fauna that develops after a planting is not a statement (if you plant it, they will come) but a question--if you plant it, who will come? Some planting and restoration projects have proceeded on the premise of fixing a site without adequate recognition of what was already there or in the vicinity and how it will (or won't) be able to survive to benefit from restora-

tion. The existing habitat prior to habitat creation may be undervalued for its butterfly biodiversity. Many animals colonize a planting, but what ones? Migratory species, including interesting bird species, will use it if the type and structure are appropriate. However, based on our experiences and readings, the rarest migratory grassland birds (such as Henslow's and Grasshopper Sparrow, Short-eared Owl) occurred in few examples of plantings, and even fewer when restricted to breeding season observations. Furthermore, migratory butterflies are generalist species relatively few in number. Most generalist butterflies are non-migratory, and specialist butterflies are typically year-round resident species with low dispersal tendency. This reality needs to be recognized not just in the ecology of natural ecosystems but also in our concepts of habitat creation and restoration.

The corollary to Haldane's oft quoted but possibly apocryphal quip about the creator's inordinate fondness for beetles is an inordinate number of sedentary specialists. While specialists are a minority, they are still surprisingly numerous given how ill-equipped they are for the dynamism of the modern unconserved landscape and even our ecological concepts of preserve management. Despite nature's dynamics in climate and landscape events, in the past the necessary habitat components consistently occurred for a remarkable number of these localized butterflies to persist in enough places to keep existing as species, at least until recently. The question today is how many will continue to persist under the rapidly changing conditions of landscapes dominated by human uses.

SITE SELECTION

Never-tilled native grassland vegetation (meadow or prairie) that is intact and original in composition is rare and needs to be retained as is. Do not plow it! The most important goal is to retain the biodiversity there now, and prevent its further loss and erosion. It may be possible to enhance and "improve" the vegetation through careful management to reduce brush and weeds and favor native floristic diversity. But the overriding priority, even if the prairie is degraded, is first do no harm to the native biodiversity there now.

An "old field" is a long-untilled grassland that is a reversion from former intensive agricultural use. Expect an old field to contain mostly common widespread weedy plants, both native and non-native. It's unlikely to contain much diversity or abundance of uncommon plants. However, if the former use was grazing rather than plowing, some unpalatable native plants may have survived, including some uncommon ones. However, old fields can certainly contain rare grassland animals. This is especially documented for grassland birds. Such sites usually have low butterfly diversity in them and are unlikely to have uncommon or local butterflies, because the plant diversity is usually relatively low and often primarily non-native, plus the butterflies haven't had much opportunity to discover the site. (By the way, a "new field" is a planting on freshly tilled soil, or the first weedy profusion that develops after abandonment of cultivation.)

However, weedy and degraded habitats can be underappreciated for their conservation value. An old field can be highly valuable habitat for some plants and animals. A lot of excellent habitat for common butterflies, and even some localized ones, in the Midwest is serendipitous. No specific effort was made to make it good for them, yet it is. Many butterfly species have inconvenient or unpopular caterpillar food plants such as violets and docks that aren't rare but may not be included or establish well in plantings yet do occur in *some* old fields. Thus, old fields can be valuable habitat as is, perhaps more useful than a planting, even one considered successful. *Some old fields may have the butterfly advantage over plantings (new fields created today) because the old fields acquired butterfly colonizers from the landscape back then. Plantings today depend on the ever more fragmented and degraded, therefore more butterfly impoverished, landscape of today for colonizers.*

An old field can be managed to remain as is, or rehabilitated (improved) in its native plant diversity and structure. However, this rehabilitation should be mindful of the principle of maintaining butterfly populations in the site. A butterfly population can persist consistently in an area if the resources and conditions it requires

occur *consistently* in sufficient amount and proximity when it needs them and enough individuals of the butterfly exist continuously to utilize them. Thus, any efforts to improve a site need to be mindful of consistently maintaining the butterflies themselves as well as their resources, or the habitat project won't be an improvement from the point of view of that butterfly. Even if the site eventually gets back to its prior condition, or becomes improved habitat for the butterfly, the butterfly can only benefit if it exists viably in or near the site to repopulate it.

A planting project is most suitable for land that was formerly lawn or plowed crop-field. Since there's little biodiversity there now, there's little risk of biodiversity loss during the process of establishing the planting. Typically, steep sites are avoided and relatively level ones preferred, to avoid erosion. However, if converting a lawn or cropfield to a planting here means plowing a prairie or old field there to replace the site being planted, then please do not do the planting and instead try to prevent the plowing of the prairie or old field.

CONSEQUENCES OF FRAGMENTATION

The places in the landscape most important for maintaining localized and specialized butterflies are not always obvious to identify. In less fragmented, degraded landscapes, there's a good correspondence of vegetation type to butterfly fauna. In other words, it is possible to define typical (predictable) faunas correlated to vegetative classifications. However, in more fragmented, degraded landscapes, this correlation reduces. That's because butterfly populations are missing from many sites of vegetation that look like their habitat, because the site is too small or too isolated or had some management bottleneck in the past (brief heavy grazing, or too large-scale mowing, or too much fire) that wiped out some butterfly populations even though the plants fared better. Since recolonization of extirpated butterfly populations is more likely in intact than fragmented landscapes, losses in degraded landscapes are less likely to get "fixed" later by recolonizations. If they can't get fixed, then those butterfly losses are permanent.

Especially in fragmented landscapes, long-term habitat consistency becomes a rela-

tively more important variable for explaining what butterflies are found where now, but long-term habitat stability is a difficult variable to "see" when visiting a site only now.

That is, you can see the plants and identify the vegetation type now, but the long-term land use history is not so easy to discern in a visit today. As a result, some sites "overperform" expectations based on their current vegetative appearance and have relatively better butterfly faunas than expected based on their size, isolation, and/or vegetative composition and quality, because past land use has been optimally benign. Relatively rare butterflies usually require relatively common plants (although usually native species) as caterpillar and adult resources. If that benign land use history was something the rare butterflies themselves could survive, then that land use was likely more than adequate to maintain their required plant resources too. On the other hand, other sites "underperform" their wonderful vegetation that lacks many or all of the specialists appropriate to that.

The only way to know for sure which sites are most important for specialized butterflies is to survey for several years to see what's there. Looking at the plants alone is not a safe shortcut for indicating what sites must or can't have specialists. Thus, it is necessary to survey for the butterflies themselves (see Part 6).

PLANTING POINTERS

Habitat creation is a long-term and relatively expensive project. Expect one growing season of site preparation before planting. Then allow at least 2-3 years for the planting to establish. But it requires a number of additional years of active monitoring and management to ensure that the native plants "win" out over the weedy ones, until you can stabilize into a routine maintenance regime.

The conservation value of doing native plantings can be relatively over-appreciated. Plantings typically consist primarily of common, horticulturally amenable prairie plants. The goal of a planting is to establish a greater preponderance and diversity of native plant species than typically occur in an old field. This sounds obviously preferable to an old field, not only for plants but for animals. However, as discussed

above, getting a lot of the animals, especially insects, to a successful planting is a significant obstacle. And this assumes the planting actually succeeds for plants.

In my casual observations, I've observed about a 50% failure rate of midwestern native-species plantings. I define failure as abandonment of the planting via plowing it under or season-long lawn mowing of it, or domination by non-native weeds. When a planting on former lawn or actively cultivated field turns out to become a field of noxious weeds, this result can't automatically be assumed to have caused no harm (other than wasting time and money) because the failed planting is a massive exporter of noxious weed seeds. Therefore it is now causing harm not just in situ (which is what a lawn does) but also in the surrounding landscape (which a lawn does mainly via runoff as do failed plantings with poor cover of the soil surface). My failure rate does not count other plantings dominated by grasses (even if native ones) with few "forbs" (non-grass wildflowers). From the point of view of butterflies, those are also less desirable. Such disappointing results may be apparent from the outset, or the planting may start out OK but without devoted management year after year, may decline in quality. It takes many years for a field to stabilize into vegetation that doesn't change markedly from year to year.

If an old field has succeeded in becoming stable good butterfly habitat, that's worth valuing. A planting is time-consuming (counted in years, not days or months) and expensive, so it's important to evaluate whether it's worth the risk of failure. Even if it succeeds, what are the chances that it will support more kinds of animals, including butterflies, than are there now? This depends on the landscape around your planting remaining a diverse reservoir of animals over the course that your planting becomes established, so that your planting, after first being a biodiversity sink, can become a place they can colonize once it's established. If you are new to plantings, it is advisable to start small to reduce the risk of large-scale failure.

Because of the risk that an old field supports more kinds of butterflies than a planting will, plantings should occur on formerly tilled land (or lawn), unless installing a

planting there will cause a prairie or valuable old field somewhere else to get tilled (or converted to lawn) to replace it. If that's a possibility, then please try to protect those prairies and old fields as is for habitat instead. I call your attention to this possibility not because I have a specific example of this in mind. Instead, I see this as one hypothetical way that the ever-changing land use choices humans make in the landscape could end up having this particular type of adverse outcome.

Cropland can help conservation as is if that cropland is used in an environmentally sound manner and some revenue from that cropland is used to manage butterfly hotspots to retain those butterflies. This is yet another alternative to consider in the larger picture of cost-benefit for butterflies and their habitat. Instead of risking a planting failure on that plot, perhaps that plot can help conservation more by staying a cropfield. If it is farmed responsibly, that can be environmentally compatible and prevents weed export that can occur from an abandoned cropfield or failed habitat planting. There's certainly tremendous expertise in the Midwest on how to farm a cropfield so that it yields a marketable crop and few weeds. If revenue from that is used to maintain a specialist butterfly hotspot successfully (see Part 4), that may contribute more overall to conservation than a prairie planting.

If you are considering a planting, the analogy that works for me is to view the site as having lots of chronic health conditions that require lots of monitoring and maintenance. So it's important to define your scope. To return to my analogy, in the context of a chronic medical condition, these questions are relevant. What treatment plan do you pick? What are the risks vs. potential benefits? What's the failure rate? Are you willing to do your part to make a particular treatment plan work? Some treatments are only worth trying if you are committed to the diet, or exercise, or therapy that must go with them. In the context of a planting, ask these questions. How much budget do you have for start-up and maintenance? How many people are available to work on the project? How much time and patience do you have? How much experience do you have with this?

In a habitat creation, do you want the most area possible or the biggest result soonest? There are tradeoffs in time vs. area. Covering the most area possible within your means requires establishing your habitat from seed, which costs less but takes more years to establish. To get the biggest result soonest requires setting out established plants. You can either buy the plants from a nursery, which is the quickest and easiest way, as well as the most expensive. If you start the plants yourself from seed by growing them in pots indoors or in a greenhouse, you reduce the cost but lengthen the timeframe of your effort. But either way the plants get started, when you plant them out, you know what they look like. This is not a joke. When you plant seeds, unless you're an expert on what prairie plants look like when they're seedlings, as well as the many weeds also prevalent in the area, you don't know which is which when they come up in your planting. Don't forget that you can use a mixed strategy, either for different sites, or for different parts of the same site. And you can proceed in phases, so that you don't try too much too fast and can find out your patience level.

Technical knowledge and equipment are well developed to enable planting success. The prairie planting guides I've seen in books, nursery catalogs, and pollinator meadow guides are generally fine in the technical sense of how to do site prep, select an appropriate mix of seeds or plants, plant them, and manage the site as the seeds and/or plants are establishing. There are contractors for hire and even volunteers for free to do any and all aspects of prairie plantings (site prep, seed planting, ongoing site management). Many seeding ratios and rates as well as pre-packaged mixes (including "butterfly" mixes) are available that are appropriate. By and large, I think these available resources are adequate in quality and expertise.

I especially recommend Chapter 6 in The Xerces Society Guide, *Attracting Native Pollinators*, by Eric Mader and colleagues (2011: Storey Publishing, North Adams, MA) for its excellent detailed instructions on how to establish a "pollinator meadow" (native planting). It is beyond my scope here to go through the details of site preparation, plant selection,

installation, and maintenance of a planting. Chapter 6 in this book is outstanding for providing the expertise and detail needed to be successful at this.

The primary causes of planting failure (from the point of view of plants) I've observed are in implementation. Usually the right tools are used and plant species selected. The most frequent problems are lack of adequate site prep and/or lack of adequate follow through afterward, resulting in noxious weeds overrunning the planting right from the start. Another mistake may be trying to stretch the budget as far as possible, which can lead to a seeding rate that's too sparse, or a seed mix that is less diverse. Sometimes, the years of effort do get invested properly so that the planting is successfully established, only for the people involved to lose interest or perceive that they're done, so I suspect. Neglect then takes its toll and the planting declines.

But even when primarily native plants get established, the planting can be relatively butterfly poor, even when good butterfly sites are nearby. The overwhelming practice is to emphasize grass too much, both in relative composition and in height. Sometimes I think this is to make it clear that this is a deliberate planting, not just laziness on the part of property owner (lawn grass doesn't grow that tall) and not just a decorative garden. Also grass is cheaper, and grass is essential for fuel to carry fires, which are a popular way to manage plantings and which usually favor grass and lead to even bigger fires, round and round. However, vegetation dominated by tall grass and sparse in non-grass flowers is usually poor in butterflies.

Furthermore, a lot of native plants aren't all that relevant to the particular butterflies in that neighborhood. However appropriate those plants may be to that site's location and condition, they aren't successful at attracting many butterfly species. These other native plants aren't harmful to butterflies, and aren't harmful to include in a planting. Indeed, it's desirable to have a native planting be more diverse in native plant species than just those ones obviously relevant to butterflies. However, it is necessary to pay special attention to ensure that a planting does include a good diversity of those plants relevant to

your area's butterflies. Otherwise, it's definitely possible to do a successful and diverse native planting appropriate to a local area's flora yet be poor in appropriate plants (especially caterpillar resources) for that area's butterflies.

A factor affecting the butterfly fauna in a planting is the choice for ongoing maintenance management, after the planting has become established. Of course, it's difficult to make site preparation, planting, and initial establishment sympathetic to butterflies. You have already made the choice that you are not trying to retain butterflies, but instead hope they colonize the site afterward. However, once established, plantings usually still require ongoing management to maintain the native diversity of plants. Management choices at this stage can determine how much butterfly colonization and establishment is possible. Wherever possible, when you have a choice in the kind of management, I advise mowing and brush-cutting over burning (see Part 4). Unfortunately, many prairie plantings are very intensively managed with fire, and often also mowing, resulting in aesthetically very pleasing sites remarkably poor in butterflies, even compared to nearby old fields.

As a result, there is a paradox that plantings appear more effective in urban than rural settings. A lot of research shows clear benefit to butterfly gardening and native planting in urban and suburban settings. That is because the comparison is to alternatives extremely hostile to biodiversity, such as lawns, gardens of non-native ornamentals, and weedy patches in roadsides, driveways, and parking lots. In that context, it makes sense to promote any kind of native planting. However, in rural areas, we butterfly fans are comparing plantings to other areas we seek butterflies in—roadside and powerline rights-of-way, woodlots, old fields, prairie preserves, state parks, and so on. I have yet to see a planting (habitat creation) able to compete with those, even when side by side. As a result, plantings are not top sites for butterfly sightings, even though there are a lot of habitat creations out there getting a lot of conservation resources invested in them.

Although I may sound discouraging, I think all these cautions can lead to better outcomes for plantings. Those doing plantings

may be so focused on the image of the beautiful prairie they're going to create in the future that they don't consider all the ways their plan can fail and possibly even harm. I'm focused on increasing the odds that the future actually is better for butterflies by learning from mistakes and at the minimum retaining what we've got now instead of losing even more. The more we study how butterflies respond to plantings, the more we can investigate ways to make plantings something butterflies want to respond to.

In conclusion, these factors appear important for making a planting more useful for butterflies. Select a site that has very little butterfly value now, near a source habitat for butterflies if possible. Scale your project to the amount of your resources and commitment. Plant as much variety of native plants as possible, especially non-grass flowers relevant to butterflies as caterpillar and nectar flowers, but be sure the selected plants are well suited to the site's soil and moisture conditions. Visit the site frequently throughout the year each year to do management in moderation as needed to establish and maintain the planting. Tolerate some of the plant diversity nature gives you for free, including non-native plants in controlled moderation, because butterflies appreciate these plants more than many ecologists do! Although initial management of a planting uses techniques that are not butterfly friendly (e.g., plowing, burning), convert over to butterfly-friendly management as soon as possible once the planting is established, such as rotational mowing rather than burning (see Part 4).

ALTERNATIVES

How can we make prairie plantings outperform old fields, as they ought to? Prairie plantings are generally not butterfly venues but many old fields are. These are not ordinary old fields, to be sure. There's lots of room for more research into the management history and landscape context of all-star old fields to understand what makes them so valuable for biodiversity. I encourage you to consider these questions as well in your habitat projects. What's going right in some old fields that is good for butterflies? What's not working for butterflies in most plantings? What's going right in the few plantings

that are doing relatively better?

One alternative is to rehabilitate an existing field but this involves a lot of issues and tradeoffs to consider. It's very difficult to reduce the non-native plants without also using drastic means that are risky for the insects already living there. You may also not find many of the recommended native nectar flowers there. But many plants not in a planting guide are valuable nectar flowers too. Let the butterflies and other pollinators show you the best flowers they're already using in your field. You may also find that your old field actually has a greater variety of nectar flowers, not to mention caterpillar food plants, than many plantings do. Avoid large-scale drastic soil baring events, because this allows aggressive weed seeds blown in or already in the soil a chance to establish. Shrubs (such as willows, sumacs, oaks, and poplars) that resprout from the roots will do so whether you cut or burn them. That's why effective brush control usually involves herbicide treatment. This needs to be focused on the shrub while not affecting the surrounding herbaceous vegetation. It is best to consult a local nursery for expertise on which herbicide is most appropriate in your area for treating the particular brush you have. Follow their directions scrupulously, both for your safety and the safety of the nature in your habitat. Mowing is preferable to burning for insect management. Do not mow the entire habitat at once. It's preferable to mow only a minority (e.g. 25%) of the habitat) in any growing season. The mowing can be beneficial for helping to maintain a variety of wildflowers, while the unmowed areas are beneficial as wildlife cover. Please see Part 4.

Sites that have sparsely vegetated or bare spots are amenable to seeding over those patches without soil preparation or drastic large-scale impacts to the overall vegetation. This is a way to increase floristic diversity in the site while retaining the flora and fauna there now. Seeds of appropriate species can be scratched lightly into the soil surface. This has worked at the pine barren restoration at Mirror Lake State Park, Wisconsin. This project was featured in the Spring 2005 issue of *American Butterflies* (volume 13 issue 1) and in "Successful Butterfly Conservation Management" posted

on the NABA website (www.naba.org). The site has sandy soil less prone to non-native weed proliferation. The species seeded in included caterpillar food plants and nectar flowers to cover the full season from spring through early fall. It is a joy to see a profusion of rough blazingstar to cater to the nectaring needs of abundant Leonard's Skippers!

Another way to view a planting is as an analog to a butterfly garden that complements the landscape context it occurs in. In other words, don't compete with (try to replace) the vegetation around your site. Instead, try to identify what you can put in your planting that complements (adds) to what is already in your neighborhood. For example, weedy fields can be where the horticulturally undesirable caterpillar food plants are. Your planting of native caterpillar and nectar plants can be juxtaposed to that—increasing the plant diversity in the area while not disrupting what insect fauna is already present. If you can find a way to keep your native plants from being overrun by those weeds in the surrounding landscape, small patches of native plants embedded in an already established vegetation may be useful. The native plantings that get used the most are the ones where butterflies travel the least to get to them. This approach views planting as a way to increase valuable resources to existing butterfly populations,

rather than scrapping what's there and hoping to start completely over.

The best butterfly gardens are useful guides to making habitat plantings more beneficial to more butterflies. To be honest, my butterfly garden is not all that impressive. It's small and gets minimal attention in prime butterfly season. After that I'm swamped with data compilation, or catching up on rest, and before I know it, another growing season is over. But I've visited outstanding butterfly gardens. They're remarkably large and diverse in the flora that specifically caters to the local preferences of the local butterflies. Based on detailed observations of those butterflies in all their life stages, these gardeners figure out ways to tuck the unobtrusive and unshowy caterpillar plants in among the aesthetically pleasing ones. Consistent nectar is available of course, along with adequate moisture (including in droughty periods) as well as shelter such as leaf litter, grass clumps, and shrubs. So I encourage you to conceive of your habitat creation as a butterfly garden scaled up in size and insect species targeted. The Xerces Society Guide, *Attracting Native Pollinators*, by Eric Mader and colleagues (2011: Storey Publishing, North Adams, MA) can help you broaden your habitat concept to include other insect pollinators.

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Published by the Southern Wisconsin Butterfly Association (SWBA), a chapter of the North American Butterfly Association. To find out about field trips and meetings, please visit <http://www.naba.org/chapters/nabawba/>