



NORTH AMERICAN BUTTERFLY ASSOCIATION

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MANAGING FOR BUTTERFLIES IN PRAIRIE **Or, what do I do now, that I want to manage for butterflies?**

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It's impossible to simultaneously manage favorably for all butterfly species native to a given habitat type, including prairie. For example, Viceroy's are favored as a prairie brush in with willows, because that is a caterpillar food plant for this butterfly species. But as brush increases, the extent of grassland habitat is reduced, which in turn reduces the butterflies needing that.

So, managing for butterflies means managing for a subset of butterflies in a site. This is the case whether you consciously recognize that you're choosing this subset or it's by inadvertent default. If you've decided that you're going to manage for butterflies, the results of your management activities will be more predictable and effective for butterflies if you recognize this first step and approach it deliberately: You must focus your management on a subset of the butterfly species appropriate for your habitat.

This, of course, implies that you're considering any butterflies at all in your management activities. Usually butterflies aren't at the top of a wildlife or habitat manager's agenda, or even on the agenda at all, at least voluntarily. If a butterfly is listed as federally threatened or endangered, or – depending on the state – is so listed at the state level, legal regulations can compel certain managers and landowners to include consideration of that butterfly in their management program. But whether butterflies are a management objective or not, butterflies present in the habitat being managed are just as affected by whatever management occurs.

Not taking any land management action is also a management choice with a management consequence, even if it is the result of neglect and not a purposeful decision. Some sites of just about any habitat type (prairies, savannas, barrens, wetlands, forests) may change very little when left alone with no human intervention in the site. But often a site

(whatever the habitat type) changes in nature as well as kind and number of species present when it is left entirely alone from human intervention. Whether this change is good or bad can only be evaluated based on what species you are considering and whether it benefited or declined as a result of the habitat change. In fact, whether the site has actually changed in a meaningful way must also be evaluated species by species. Sometimes a site may look quite different to humans but this may not have affected a particular butterfly species because the resources it requires remain largely unaltered. On the other hand, sometimes a site may not seem to have changed at all to human eyes but some subtle change nonetheless occurred that dramatically affected a particular butterfly species.

So, doing nothing sometimes has the consequence of habitat change in a site. In such a case, some sort of management is necessary to keep the site the same. Of course, other forms of management will cause the site to change in some way other than it would have changed if left unmanaged. It is not necessarily easy to know ahead of time whether a site will stay the same in the absence of any management, or which management regime will keep the site consistently the same.

Furthermore, lack of human activity in a site does not necessarily mean that it is more natural than a site where humans are implementing management. People have greatly altered the landscape they live in. We've eliminated some species (such as predators) and introduced others (such as exotic plants). We both suppress and start fires. We drain some areas by ditching or land contouring. We flood others by dams, increased runoff from pavement, and channelization. In such a context, even a site where no people are conducting any particular management activities cannot really be considered unmanaged (unaffected) by

people. In fact, that site is being "managed" (affected) by all the human activities in the landscape around it. So, both deliberate and unintentional management actions and inactions, both within and surrounding the site, have consequences for the habitat and species within a site, including the butterflies.

The question of how to manage for butterflies entirely depends on what your overall management goals and constraints are. Often, butterfly management is a matter of figuring out how to include butterfly goals into an already existing management program or land use plan.

Should managers care about butterflies? They pollinate flowers and serve as food to many hungry animals. Their caterpillars are of particular importance in feeding songbird nestlings. Butterflies may attract interest, visitors, even tourism. To the degree that biodiversity – that is, diversity and abundance of native species – is a value in the management agenda, then managing for butterflies contributes to achieving this goal. But the decision of how much butterflies matter to a landowner or manager, and which species, and how many of them, is a subjective matter of personal taste and available resources. Scientists can't tell you the right or wrong answer to these management questions. But they can try to clarify for you the consequences of your choices and the most effective known ways to achieve your goals.

So now I'd like to change the question somewhat. I'm not going to debate whether butterflies should be on the management agenda, and which species, and at what level of priority. I'd like instead to answer a question more addressable by scientific research:

How can the odds be improved that butterflies localized or specialized to native prairie vegetation will continue to persist?

In considering this question, I will not be discussing the majority of butterfly species, and there's a reason why. Most butterfly species are ecologically flexible and adaptable. Some scientists call them "matrix" species because they are widely distributed in the general landscape all around us. Others call them generalists because their habitat requirements are easily supplied in a variety of ways readily available in the landscape. These butterflies do still have particular resource needs. For example, Monarch caterpillars feed only on milkweeds. But Monarchs occur

widely throughout North America because they can seemingly breed in about any milkweed patch they can get to, and the great variety and adaptability of milkweed species mean an abundance of milkweed in a great many places. Such butterfly species tend to have relatively more mobility. They may disperse around the landscape more widely, and when they do so, they have a good chance of encountering suitable habitat. While many of these butterfly species remain resident in a certain general area their entire lives, other species – or some individuals of other species – may migrate or wander widely around the continent.

Of course, on the edge of their ranges, even these flexible generalist butterflies can be localized in distribution and uncommon in abundance. But still, I'm not focusing on these butterfly species. They will continue to occur in the general landscape whether it's conserved or not, and whether it's primarily native and pristine or largely altered and domesticated by humans. These species will continue to exist whether we attend to them or not. Hard as this may be to believe, European research bears this out. They have analyzable numbers on butterfly distributions and abundances for more decades – even centuries – than in North America. To be sure, that continent has known the dominating, landscape-altering presence of man for millennia. Not only have they found that many butterflies withstand this human imprint in the landscape, but some butterflies can even thrive and increase. Such butterflies are typically flexible matrix generalists.

However, the matrix generalist butterflies are still fascinating. They're our most familiar butterflies because they're the ones that live closest around us. If you want to encourage these species in your area, consider these points.

First, your site needs to be in range of the species. Second, your site needs to contain those resources the species requires. This is usually rather easy to determine by consulting field guides and butterfly reference works. Focus foremost on having a generous supply of preferred caterpillar food plants. Also attend to providing suitable food resources for adults, primarily through flowers containing nectar attractive and accessible to butterflies.

The species I am concentrating on here are the ones that occur in localized populations, not widely and commonly throughout the landscape at large. That's because these species are particular about appropriate habitat conditions. They require native configurations of native plants (that is, natural vegetation). Often only one or

a few native plant species in the area are used as caterpillar food. Field guides and reference works often list some of these plant species but the necessary food plants in your area may not yet be known. It is typically observed, though, that these caterpillar food plants occur in greater abundance and in a greater variety of conditions than do the butterflies specialized to feed upon them. Caterpillar food plants are necessary to have these butterflies, but so are a number of other factors in addition to these plants.

Localized and specialized butterflies tend to be losers when humans alter the landscape. Even in the core of their natural range they still tend to be localized and specialized.

These butterfly species tend to live in a particular fairly small area their entire lives. Even though they may be strong fliers, they tend not to disperse far around the landscape. Were they to do so, their chances of finding another place with suitable habitat resources may be quite low. Should such a butterfly disappear from a given area where it used to live, the chances that individuals of the species will colonize the site from somewhere else, and repopulate it, may be quite small. If people do not carefully attend to providing for their particular needs, these butterfly species could easily be lost from the area.

If I manage for localized specialist butterflies, will my site be poor in other butterfly species? In general, if you manage favorably for the localized specialists, you will also have lots of matrix generalists. Localized specialists tend to be a small minority of the butterfly individuals and species in their habitats. These habitats – such as native undegraded prairie – may be of a very particular and special type with a restricted occurrence in your area, but these sites also support numerous commoner butterflies. The point is that these places are the only ones that can have the localized specialists too. Furthermore, the localized species are much more likely than the matrix generalists to be lost from the site in the absence of deliberate favorable management. The generalists that live amongst the localized specialists also inhabit many other places where the localized specialists do not occur.

Managing for prairie-specialist butterflies: principles

More is better: more patches of suitable habitat occupied with more individuals of the butterfly species.

Closer is better: nearer and more connected patches of suitable habitat occupied by the butterfly.

Stability is better: consistently appropriate habitat conditions consistently available. This applies to the species and growth forms of plants in your site, as well as its history of land use and management. Also relevant are such factors as microclimate (temperature, humidity) and exposure (sheltering cover) appropriate for the butterflies themselves to continue surviving, whatever life stage they might be in at the time. Each species has its own particular range of appropriate climatic and exposure conditions. Since localized butterflies live in their sites continuously, these sites must be continuously suitable for them every day of the year, year after year, for the butterflies to keep existing. It's so much easier to keep the butterflies you've already got than to change the habitat and try to get a new set of butterflies appropriate for that habitat established in your site. So it's advisable to follow a strategy of working with what you've got and emphasizing what those species require for continued persistence in the site.

More knowledge about the species is better. Consult books and any experts you can identify on the species, and also study the butterflies in your own site and region. The experience and knowledge of others is invaluable, but so is the experience and knowledge that can only be obtained from your own particular butterflies.

More monitoring of the butterfly is better: This means monitoring the butterfly, not just the habitat (plants). But keep calm about those dramatic annual fluctuations! It is normal for insect populations to vary in abundance among years. It depends on the species how much annual fluctuation is normal. For some species, these fluctuations can be quite dramatic. A purpose of monitoring butterfly numbers year after year is to characterize the nature of these fluctuations and to distinguish these fluctuations, which go up as well as down, from trends, which tend to keep going in one direction year after year. If the trend is down, the butterfly will eventually be lost from the site (even if it sometimes has a fluctuation that goes up a bit compared to the previous year) unless something can be done to change this trend.

Land management activities affect butterflies both directly and indirectly. (1) Effects of the management treatment on the individual butterflies present in the habitat: How is survival or mortality of the butterflies themselves directly affected by the management activity? (2) Effects of the management treatment on the habitat (plants): This is an indirect effect on the butterflies, but is also very important,

as it determines what plants are present and in what growth forms and abundances. Does the management result in habitat suitable for the butterfly? On one extreme, a management activity can have negligible effects on the butterflies themselves but the effects on the vegetation result in unsuitable habitat for the butterfly. On the other extreme, a management activity may result in highly suitable vegetation but in the course of treatment causes heavy mortality for the butterflies. In both cases, it is likely that the butterfly will decline or die out in the site. In the middle are various combinations of how much the management directly affects the butterflies themselves and how much the management produces suitable or unsuitable vegetation for the butterflies. It is the combination of these two effects – directly on the butterflies and indirectly, via effects on the plants – that determines how suitable a management is for a butterfly species. How many butterflies are left in the habitat after the management activity, and how are these butterflies affected by the vegetation resulting from this management?

More intensive management treatments should be sparing and localized in application. More intensive managements, such as burning, herbicides, and plowing, can cause heavy mortality for the butterflies themselves and are more dramatic in how and how long they affect (change) the habitat compared to what it looked like before treatment. Such managements should be used as sparingly as possible in localized applications addressing specific habitat problems. If you use these treatments in areas that don't have problems, you are disproportionately harming the localized species that are still hanging on in your site despite its habitat problems precisely because they can survive in those good spots. A concrete idea of the intended habitat result should be formulated ahead of time to determine whether the intensive management is producing the desired result. If it is not, another method should be sought to obtain this result. Exercise extreme caution in applying an intensive management treatment: acquire adequate training first, follow directions carefully, conduct a treatment only under suitable conditions, and have prepared ahead of time the equipment or remedies necessary for use in case the treatment does not go according to plan.

Less intensive managements should also be applied to only a portion of the habitat per year. A single management treatment of mowing (mechanical cutting that leaves the cuttings in place), haying (mechanical cutting that subsequently removes the cuttings), brushing,

tree-cutting, or unintensive grazing is typically less lethal directly to the butterflies inhabiting grassland habitat. Nonetheless, negative direct effects are possible. Furthermore, some butterflies do better in an area rested several seasons after such a management activity rather than in an area currently being so managed. Thus, it is beneficial to have various areas in the same site in differing amounts of time since the last management treatment.

Invasive exotic plants (weeds) are rarely the actual problem. On occasion an aggressive exotic plant may invade a site with no apparent cause other than that it reached the site. But most of the time, the expansion of undesirable weeds in a site is a symptom, rather than a cause, of environmental degradation. That is, ecologically intact sites in appropriate management tend to be more resistant to invasive plants than already degraded sites. So the most important issues are understanding how the exotics got a foothold in the site in the first place, whether anything can be done about these underlying causes of exotic invasion, and whether exotic control activities are more lethal to the butterflies than the exotics themselves are. Like any other management activity, exotic control affects butterflies both directly and through indirect effects from the resulting vegetation. Butterflies can be better off eking out a living alongside exotics than getting eradicated with them. The best defense against exotic invasion is watchful vigilance. Once an exotic incursion has been detected, consult experts as soon as possible on its control and eradication. Do not act against the exotic until you have found a proven method of success in controlling it that does not cause undue harm to the butterflies and the vegetation they require. The wrong approach to exotic control can be worse than no attempt at control – the exotic may inadvertently be benefited while the butterflies and the native vegetation they need may be harmed.

Apply management treatments for specific results and purposes. Do not apply management treatments just because "everyone does it" or "experts" say that these are the managements to do and they're supposed to happen periodically on a schedule. Butterfly management experience around the world indicates that the most successful programs are not based on theory but rather on specific knowledge of the butterfly and the site, concrete goals, and a ready willingness to modify the management program as ongoing results indicate. Looks should follow function: instead of managing for beauty, learn to see the

beauty in what is successful management.

Overmanagement can be at least as harmful as undermanagement. The only way to know if you're doing the right amount and kind of management is to have specific goals for what you want your management to accomplish and to monitor the results of your management to see if you are achieving these goals. An appropriate philosophy would be this: First do no harm, and then try to do some good.

Habitat management is a long-term commitment. Good results last from your management program only for as long as the management treatments continue to cause the habitat to be suitable and occupied by the relevant butterflies. If you are impatient for results, or want to move on to something else after a few years, it's probably better for you to pursue something else in the first place.

A word about rehabilitation and re-creation

If your site already contains excellent habitat, your goal may be to stay this course. If your site is degraded but has some natural features and species, your goal may be to fix the past. If your site is entirely degraded and unnatural, you may want to scrap the past and start completely over.

But it is not always clearcut just how to classify a site. One person may view a woodlot as natural forest habitat, another may view it as a degraded savanna that needs partial clearing to increase the grassy openings. Yet another may want to start all over by clearing the site of all overgrowth and planting ("restoring") a prairie.

Butterflies will also have a variety of points of view. If a localized species is barely hanging on in the site, it may die out without active management intervention to improve the habitat. But of course, the butterfly must survive the management program in order to benefit. Since it is at low numbers, there's very little margin for error in how the management program affects it.

Even quite degraded sites can contain some localized species. If they can obtain the resources they need in sufficient quantity, it can matter little what else occurs there, even if it's nonnative. As mentioned earlier, it's easier to keep the butterflies living there now than to change the habitat and get the new species appropriate for that habitat to establish there. Furthermore, the habitat specializations of localized butterfly species make it very difficult to create entirely from scratch a habitat patch sufficiently suitable for them to succeed in. Thus, taking a degraded site and changing it into a planting of another habitat type, even with

a greater abundance and diversity of native plants, may have the result of changing a site from having a few localized butterflies of regional significance to a site containing perhaps more kinds and individuals of butterflies but all matrix generalist species.

Some purists think that only as natural a vegetation as possible is ecologically best. For example, if a site is in an area that was originally dominated by prairie, then a given site there should also be prairie, no matter what it is now and what it contains. However, nature itself is not necessarily much of a purist. Pockets of relict prairie or prairie-like openings occur in New York State, well east of the prairie region in the mid-continent. Quaking bogs occur in Iowa, well south of their typical boreal occurrence. Just because a certain vegetation type was the prevailing habitat in an area during a certain epoch does not mean that vegetation occurred exactly in the location you are considering. Furthermore, it is useful to ask yourself not just what might have been there 500 years ago. You might also ask yourself what is most useful and feasible to have there now.

How to devise a management plan

- Become familiar with your site: its particular characteristics, species, and history.
- Define your goals and interests for the site.
- Assess your limitations: resources, local ordinances, time, etc.
- Study: read, ask, observe.

Examples of successful management

No one management regime is optimal for all localized butterflies native to a certain prairie type. However, the following can be suitable for relatively more of them at once.

Rotational summer haying: For prairies that produce lush growth over a long growing season, midsummer rotational haying can provide an excellent balance between the resource needs of butterflies now and the habitat needs of future butterflies. Cutting about 1/3 of the habitat patch each midsummer is less harmful than you might expect because the stubble still provides some vegetation for egg-laying and caterpillar feeding, and the plants usually grow back quickly. It would be particularly beneficial to cut the acreage in a given year's allotment of hay management in pieces spaced a week or more apart. That way, even less of the vegetation (foliage for eggs and

larvae and flowers for adults) is made unavailable at any given time to the butterflies. Removing the cut hay is advantageous because the vegetative regrowth won't smother and stunt under the dead clippings. Midsummer (July) haying is beneficial because it puts a check on the warm-season (summer-growing) grasses, whose height and bulk can overwhelm the wildflowers. Haying later in the season tips the balance more in favor of wildflowers and haying sooner tips the balance more in favor of grasses. Delaying the cut until the end of growing season is disadvantageous because it removes most of the protective vegetative cover when it can't grow back for months, yet the resident butterflies need this cover to survive the winter. For butterflies that are larvae during and right after the time of cutting, it is desirable to ensure that only about 1/3 of their caterpillar foodplant patches fall within a given summer's allotment of haying. Avoid scraping the mowing blade against the soil, as this damages the native prairie flora and allows openings for exotic plants to establish and spread. While brush may regrow in hayed areas, regular rotational haying tips the balance in favor of the flowers and grasses, and prevents brush from overtopping them and developing stems too large to be cut effectively by periodic haying.

Rotational fall haying: For prairies that produce less vegetative bulk in a season, or have a relatively short growing season, management with haying usually occurs in the fall at the end of the growing season. This has the advantage of causing no disruption in availability of required plant resources to the butterflies while they are metabolically active. However, it has the disadvantage of leaving very little cover (plant growth) available in the treated area over the winter. Thus, it is best to hay as little as possible per year (perhaps 1/4 of the habitat patch) that still allows the prairie vegetation to persist in an overall stable state of brush-free diverse native flora over the years. Alternatively, a portion of the site might be left "idle" (not included in the haying rotation in any year), again as long as it is remaining natively diverse and brush-free. In particularly slow-growing, unproductive areas (such as very dry and sandy barrens), part or all of the clippings may be left in place. This allows any eggs or larvae on the clippings to remain near their original location and also increases cover for the winter season. Avoid scraping the blade against the soil (as discussed in the previous paragraph). Small-scale experimentation with cutting earlier in the season to allow

some regrowth before winter, particularly in late July or August to tip the balance a bit more in favor of wildflowers over summer grasses, might be useful.

Idling with localized brush control: Especially in relatively unproductive prairies - i.e., ones not producing much bulk of plant growth per year - idling (leaving the prairie unmanaged) can be a useful long-term management option. This is also a desirable option when you are uncertain how to manage your site. If you can't be confident that a management program is good management, this is a good choice while you study the butterflies and the habitat in your site. Some brush, like red cedars and most pine trees, can be controlled simply by cutting them down close to the ground. But most deciduous brush is only topkilled by this procedure (or by burning, for that matter) and resprouts vigorously from the roots. Repeated cutting during the same growing season, perhaps continued for several growing seasons, can reduce some species, like sumacs. But for many others - most notoriously the aspens, locusts, and buckthorns - such treatment will only cause repeated resprouting that results in brush expansion laterally rather than vertically, the opposite of desired for prairie management. Proper application of the proper dosage of the proper herbicide to the brush in question may be necessary. If you are not prepared to herbicide, it may be better not to cut the brush at all. In this case, an alternative might be to maintain a swath of mowed "brush break" repeatedly cut during the growing season (like a maintained trail) around the clumps of brush, to resist spread of the brush. The more often this swath is cut, and the more years it's cut, the greater will be the reduction in plant diversity in the swath. Whatever the means of brush control used, do not remove too much brush at once. Weeds are particularly likely to take over after brush removal in a large cutover where dense shading had substantially suppressed growth of grasses and wildflowers underneath. Brush encroachment is a gradual process requiring a number of years. Brush removal should also be gradual, at the pace native prairie plants can re-establish in the areas of brush removal.

Unintensive grazing: This is a relatively poorly studied option. A lot of grazing occurs in the prairie region, but usually in intensive forms that are not compatible with maintaining a significant height (higher than a lawn), diversity, and abundance of native prairie plants. However, a few examples of light grazing have been studied that show it can

be associated with consistently diverse and abundant native prairie plants and butterflies. It depends on the type of livestock how much the animals will browse on brush and tree seedlings. The greater the stocking density, the more likely that significant soil exposure will result, which can allow the establishment and increase of exotic plants. Palatable exotic plants will be controlled well, however. It is most appropriate to manage a prairie with grazing if it has a long history up to recently of such management, and the site contains a diversity and abundance of native prairie flora and fauna. These plants and animals are likely to be favored by continued grazing in some form.

Note: Prairie management by burning is frequently advocated by botanists and ecologists, but it is not recommended here. Fire-managed prairies typically have fewer kinds and individuals of prairie-specialized butterflies, and even butterflies in general, when compared to similar prairies managed other ways such as described above. This is so not just for prairies burned in their entirety in a single year but also in ones burned rotationally (1/2 to 1/5 burned per year).

Sources

This article is based on extensive butterfly research by the author and her husband Scott Swengel on habitat management, especially in prairie, savanna, and pine barrens (heaths or sand barrens). It also synthesizes a wide variety of publications, both non-technical and scientific, on butterfly populations and habitat management, and botany

and ecology. Ann is a vice-president of the North American Butterfly Association (NABA) and co-editor of the annual report for NABA's 4th of July Butterfly Count Program.

Publications from NABA

Relevant publications available from the North American Butterfly Association (NABA); to obtain an order form: NABA Butterfly Gardens & Habitats, 909 Birch Street, Baraboo, WI 53913 or NABA, 4 Delaware Road, Morristown, NJ 07960; phone (973) 285-0907 and website www.naba.org:

- Set of introductory butterfly gardening brochures (Straight Talk about Butterfly Biology, Basics of Butterfly Gardening, Flowers for the Butterfly Garden, Familiar Butterflies of North America)
- Regional butterfly gardening brochures (providing top butterfly nectar flowers, nectar flowers that don't work, top caterpillar food plants, common butterflies, and unusual butterflies for many different regions of the continent)
- Straight Talk about Butterfly Population Biology (explains how butterfly populations operate in nature, to be applied to maintaining butterflies in habitat, no matter how humble, more effectively)
- "Open Habitats for Butterflies" by Ann Swengel, pages 12-20 in American Butterflies Winter 1996, volume 4, number 4.