Village & Wilderness

The Microhabitat Program Manual

A guide for startups and community-based organizations

By Tom Chase

Acknowledgments

This manual is largely a synthesis of others' experiences. These include those who manage microhabitat programs, such as the twenty-plus organizations in the Village and Wilderness community of practice, called the Practitioners Circle. I also learned from interviews and conversations with microhabitat researchers, funders, field technicians, and individual property owners. Finally, some of my information comes from the small number of programs I helped other organizations create, and what I learned from their staff and those who participated in their programs. All have graciously shared their aspirations and frustrations, their successes and failures, and I thank them all for their practical wisdom, time, and trust in sharing their insights.

Because these advisors represent different organizations, communities, and perspectives, seldom was there a single "right answer" to common questions. This was a strength, allowing me to present a menu of options for startup organizations to choose, adapt, or invent to fit their programs. Frequently I have had to show a range of solutions to typical problems, infer a common theme, or occasionally insert an opinion of my own. Moreover, because microhabitats are an emerging field of study, yard owners, amateur scientists, and program leaders are as much at the forefront of the movement as academic researchers.

For these reasons, I invite all readers to share their comments and suggestions with <u>me</u> to help improve this as a "living document."

I am particularly grateful to several colleagues and expert reviewers who have read all or parts of this document and given their advice. These include Erin Arnstein, Tim Boland, Chris Cardwell, Matt Collogan, Barbara Driscoll, Nina Fogel, Luanne Johnson, Jim Kleinwachter, Tania Parker, Dan Pearson, Beth Peluse, Justin Pepper, Tripti Thomas-Travers, and Barbara Tuset. Finally, and most fundamentally, this document would be impossible without the generous support of Anne and Brian Mazar, microhabitat masters themselves. Grateful though I am to all, all errors and omissions are mine alone.

This manual is a product of [Village and Wilderness](#), a nonprofit organization dedicated to helping community-based organizations invent, share, and grow replicable, climate adaptation strategies. Microhabitats stand out as a powerful, growing but still under-used strategy to help people and nature adapt to climate change and landscape fragmentation. For that reason, Village and Wilderness advanced the Microhabitat Program Incubator (MPI) as its central initiative. The MPI offers an open-access [Resource Center](#), including a directory of microhabitat programs, a bibliography of peer-reviewed research, and other informational and financial resources for established and emerging programs. All Village and Wilderness services and resources are pro bono; thus, we measure success by our impact. If you find the Resource Center's content or this manual helpful, we respectfully ask that you attribute the source to any information you pass on.
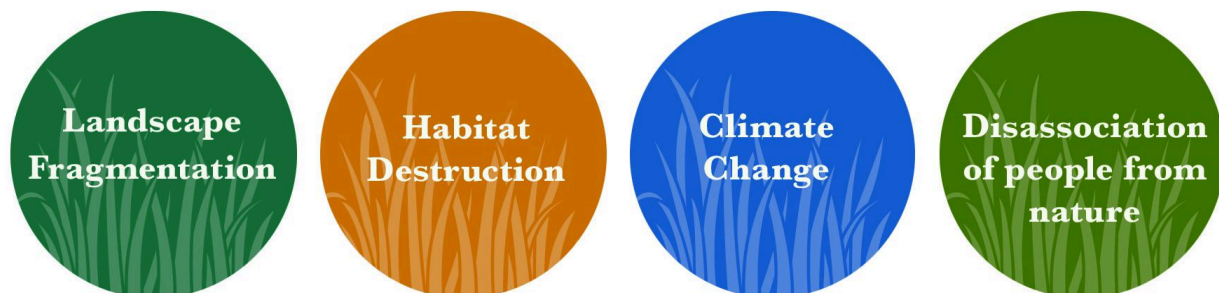
Thank you.

Table of Contents

Introduction

What is a microhabitat?

If you search the internet, you will find microhabitat defined as an area "of small or limited extent and which differs in character from some surrounding more extensive habitat" or "the microenvironment in which an organism lives." In the early phase of the microhabitat movement, most attention was focused on the suburban backyard, thus rendering them different from the surrounding sea of traditional landscaping. As the movement has evolved, it has expanded beyond native plants to creating microenvironments for many other organisms from pollinators to birds, bats, and other species. It has since moved beyond the backyard to embrace many kinds of small spaces, including roadside verges, schoolyards, vacant lots, urban neighborhoods, rooftops, corporate campuses, and the margins of agricultural lands. Thus, collectively, Village and Wilderness calls them microhabitats.

Microhabitats are place-based responses to four major changes in Earth's ecosystems:

Landscape Fragmentation　　Habitat Destruction　　Climate Change　　Disassociation of people from nature

While these changes span the entire world, they all intersect precisely where people are concentrated. As such, microhabitats do not comfortably fit under the banner of conventional conservation, in the sense of protecting relatively natural areas. Neither do they properly constitute classic "rewilding", by reintroducing ecosystem engineers (such as large herbivores and top-order predators) so that they can fulfill their ecological role in recreating and sustaining a natural environment. And microhabitats are not ecological restoration, because the areas are so small they cannot hold a sufficient complement of producers, consumers, and decomposers (e.g., plants, animals, and fungi) to interact and sustain an ecosystem. If microhabitats are none of the above, then to what discipline do we assign them?

I believe microhabitats best fit a discipline that Rosensweig (2003) coined *reconciliation ecology*. Reconciliation ecology researches ways to encourage biodiversity in human-dominated landscapes. It is based on the calculation that urban, agricultural, residential, and other uses occupy so much land that there cannot be enough natural areas left to protect the majority of the earth's biodiversity. Therefore, in addition to land and water conservation, humans must increase biodiversity where they live. If reconciliation ecology is the science, then *ecological reconciliation* is the practice, and microhabitats are one tool in that practice.

As a practice, microhabitats bear scaled-down similarities to game management, albeit usually for different goals. That is, much as wildlife technicians manage game reserves for huntable species, microhabitat managers aim for biodiversity and ecosystem services. Similarly, wildlife management is often deliberate and intensive—or at least far more so than the management of large and self-sustaining natural areas. One advantage that microhabitats have over wildlife management units, however, is that most are already intensively managed. Think of all the mowing, weeding, and fertilizing in the traditionally landscaped yard, conducted by the on-site managers who require no salary: the owners, renters, and other community members themselves who are tasked with maintaining the space. Think, too, of the many properties managed by landscaping contractors. Microhabitat programs aim to redirect these managers' energy and resources to produce helpful rather than harmful spaces.

Terminology

With any emerging field, there can be synonyms for many terms until they solidify by consensus. The microhabitat movement has not achieved that state yet, nor do we presume to standardize the language. However, for consistency in this manual, Village and Wilderness has adopted several terms throughout the document. For example, just as we use the word microhabitat to recognize small spaces other than yards, we use the word site to refer to a specific location. Again, not all microhabitats are yards; some sites are vacant lots, roadside verges, school yards, parks, and industrial or municipal landscapes. Similarly, we use the word steward instead of owner, because not all those who manage these sites own them. Stewards are sometimes renters, volunteers, landscapers, town employees, and others. We use field technicians to mean the people who advise stewards on how to manage their sites, but there are many synonyms in use including advisors, consultants, and others. Finally, we distinguish microhabitat projects from programs. *Projects* are short-term events, such as the installation of a native plant garden, whereas *programs* are long-term efforts across a growing number of sites.

Why are microhabitats important?

Conventional conservation principles maintain, correctly, that protecting large contiguous tracts of land is the best way to ensure an ecosystem's viability. Such large areas allow ecosystem functions—such as soil development, hydrological dynamics, predator-prey interactions, and others—to persist, even as they adjust to climate change. A well-functioning ecosystem sustains biodiversity, and biodiversity in turn provides ecosystem services that benefit people, such as pest and disease reduction, pollination, and water purification.

The problem, however, is that there are fewer and fewer intact ecosystems. As cities and agricultural lands expand to sustain the human population, many ecosystems have become increasingly fragmented; their ability to support biodiversity and provide ecosystem services is impaired. This is compounded by climate change; many species can no longer cross hostile built and farmed environments to find suitable habitats. Where it is no longer possible to retain or create wildlife corridors between wild lands, we must turn to microhabitats. There are at least four roles that microhabitats can play in the interests of biodiversity and the ecosystem services they provide:

1. *Buffers to wildlands*. Especially in exurban areas, yards and other microhabitats can be managed to reduce their influence and impact on adjacent wildlands. Examples include minimizing these spaces as "source" populations for mesopredators (e.g., cats, skunks, raccoons, opossums, crows, etc.), parasitic species (e.g., cowbirds), pests and diseases (Asian long-horned beetles, tree diseases transported by firewood, soil, and exotic shrubs and trees), and invasive plants (too numerous to mention), all of which, with development, can become over-abundant. They can also be managed in ways that will reduce their role as ecological traps, or "sinks," draining the biodiversity in adjacent wildlands. Examples include reducing outdoor night lights, biocides, and window and road collisions.

2. *Stepping stones*. In densely developed areas, microhabitats can serve as temporary resting, breeding, and feeding stations for migratory birds and invertebrates. The Monarch butterfly is perhaps the most famous of these, but there are other migratory species including dragonflies and bats. Microhabitats may also serve as stepping stones for species that are simply trying to pass from one wild area to another. When these stepping stones function as source populations, they may also serve as boosters to help intergenerational populations move across the fragmented landscape.

3. *Refugia*. Preserving genetic diversity is critical to enabling plants and other species to adapt to climate change. When the organisms themselves—for example, trees—cannot move with the climate, their seeds can. And even when their seeds cannot travel across hostile land, their pollen often can when carried by wind or pollinators. Those plants that have managed to persist in situ while surrounded by a fragmented landscape are demonstrable survivors and may provide important genes as the species shifts its range over time.

4. *Source populations*. The fragmented landscape is an inherently hostile one where, for many species, mortality exceeds reproductive capacity. However, with tailored management, microhabitats can boost a species to reverse this, thus becoming a source rather than a sink—and serving to colonize other microhabitats and wildlands. This pertains less often to "rare" species but is important to those species that would be common in the wild but uncommon in the fragmented landscape. Very often, these are the "workhorse" species, those normally common enough to fulfill major ecosystem functions such as pollination, predation, and food production. Some of these can be keystone species as well.

Conventional conservation wisdom is still correct: the best way to save functional ecosystems is by protecting large, intact landscapes. However, that perspective overlooks three important elements of natural systems that apply to microhabitats. One is that not all parts of intact landscapes are equally productive or biodiverse. There are "hotspots" where the proximity of resources and the quality of habitat are higher than in surrounding areas—one of the reasons that connecting intact landscapes protects them. Microhabitats compensate for a lack of connectivity with an increase in habitat quality and, in effect, become hotspots. A successful microhabitat doesn't just attract species; it produces enough of them to outpace the high mortality inherent to the fragmented landscapes, allowing enough survivors to connect to other populations. In other words, they are exporters of wildlife, not merely importers. In the conservation ecology lexicon, microhabitats can be ecological sources even when the surrounding landscape is an ecological sink.

Another feature of protecting large tracts of intact land is that, by definition, relatively few people live in them. Thus, most people do not directly receive the benefits of high-quality landscapes. (Of course, we all benefit immeasurably from intact ecosystems, which sequester carbon and provide clean air and water. But for most of humanity, those are indirect and intangible benefits.) Microhabitats support

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biodiversity, and biodiversity drives many of the ecosystem processes upon which natural areas and people depend. Thus they are a tool to abate climate extremes, landscape fragmentation, habitat destruction, and human dissociation from nature. Microhabitats provide multiple and outsized benefits for the space they require, and they provide them where people live.

The future of microhabitats

The microhabitat movement in the United States may be considered to have had its roots in the advocacy for including native plants in home gardens (for example, Robinson (1870)). By 1973, the movement had blossomed into a more holistic field embracing wildlife with the National Wildlife Federation's creation of the Certified Wildlife Habitat Program, still going strong today. The field leapt forward again with the research by Tallamy (2007) and his students at the University of Delaware, providing solid evidence for the benefits of renaturalizing private yards. In 2014, the Urban Biodiversity Research Coordination Network (UrBioNet) emerged as a collaborative network of scientists, researchers, and practitioners focused on studying and promoting urban biodiversity. Today, individual microhabitat projects may be found near urban areas around the world, including the Global South. While most of the programs we have learned about are found in the Global North, there may be many more in the Global South that are not connected to well known organizations or do not have an internet presence. For example, some may be entirely local and implemented through community networks. Village and Wilderness has much to learn. Those programs we do know about have similarities but are by no means uniform. Site certification is common, but not all offer on-site visits and recommendations, and not all are based on native plant landscaping. Examples include:

Australia
- Backyard Buddies

Canada
- Canadian Wildlife Federation's Backyard Habitat Certification Program

New Zealand
- Predator Free New Zealand

United Kingdom
- Rewild My Street
- The Royal Society for the Protection of Birds (RSPB) Garden Wildlife Program
- We are the Ark

While there is a high concentration of microhabitat programs in the United States, anecdotal evidence shows multiple points of origin around the world. That is, microhabitats seem to be emerging spontaneously and independently and in many

forms, such as Miyawaki or "pocket forests". Given all the ecological and social benefits of microhabitats—and the concentration of underserved peoples and high biodiversity in the Global South—perhaps the greatest impacts will one day be there.

Just as the microhabitat movement has expanded globally, so too has it expanded beyond the cities and suburbs into agricultural lands, where research is showing that nearby wild areas can benefit crops, by, among other things, increasing wild pollinators. The movement is also expanding into other fields, such as human health and well-being. For example, in the last few decades, much research on the "urban greening" movement has demonstrated a surprising range of tangible benefits. One outstanding example is Green Heart, the city-wide project in Louisville, Kentucky. Research on this and similar projects has substantiated many intuitive health benefits of re-greening small and irregular spaces. For example:

> **"... the body of literature assessing the effects of greenness on health provides some evidence that greenness may be beneficial for physical activity, obesity, mental health, birth outcomes, cardiovascular outcomes, and mortality."**
> —James et al (2015)

Microhabitats are already benefiting biodiversity, ecosystem function, climate adaptation, and human health, but I have observed another large, immediate, and tangible benefit that is seldom mentioned: the creation of what I call a culture of stewardship. This can occur in several ways. In the backyard, families see the arrival of new wildlife, be it new birds at the feeder or new frogs in the pond. In school yards, students participate in growing and planting native plants and convey their pride and knowledge at the family dinner table. Parents learn from their kids. In neighborhoods, volunteers work together to "guerilla garden" vacant lots and abandoned lands with native plants, and together cultivate and harvest wild foods.

A culture of stewardship is a common set of experiences, knowledge, and values that transcends wealth, ethnicity, age, and other boundaries. It becomes intergenerational. It is more than just a conservation ethic because when people work together, it also influences their commitment to stewardship of family and community as well. Unlike protecting large acreages of wildland, managing microhabitats can be fully participatory.

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Perhaps a culture of stewardship in its ultimate form will bridge Indigenous wisdom with new insights into managing nature in these fragmented ecological landscapes that we have created. New science will be needed to understand how to manage native species in novel ecosystems, but traditional ecological knowledge (TEK) has the benefit of drawing from deep time, transcending climate change, and enculturating that wisdom for the generations that follow. As we have seen with the recent and pioneering work of [MiniNature Reserve](#), which incorporates the instruction of indigenous people, TEK not only conserves but utilizes native plants, and builds community in the process.

The role of community-based organizations

In the early stages of the microhabitat movement, several national organizations promoted sound, fundamental recommendations addressed to individual site stewards. This was an important step in popularizing their goals and practices. However, to effectively counter the impacts of ecosystem fragmentation, microhabitats need 3 things:

1 Microhabitat management must be customized at several spatial scales.
First, it has to be customized to the local ecosystem. For example, advocating for native plants means different species if you are in Phoenix or Boston. Next, they need to be customized to the neighborhood. For example, you can harbor more species in rural than urban yards. Finally, the microhabitat must be customized to the individual site—a sunny yard will support different plants than a shaded one, for instance.

2 Once the ecological recommendations are customized to these scales, they must then be customized to the capacity and interests of the site steward. For example, you can't expect a steward with a bat phobia to put up a bat box, nor can you expect someone with limited time, income, or space to create an elaborate habitat.

3 In addition to this customization, microhabitats must be concentrated enough to make an impact. A thousand microhabitats spread across the country are not nearly as impactful as a thousand across a city.

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Community-based organizations are best suited to understand the history, economics, politics and culture of the communities in which they work. They can customize their program to the ecological scale as well as the cultural context. That is, a program developed in an affluent exurb on the East Coast is unlikely to work well in the rural Midwest or a low-income area of an inner city. All the benefits of microhabitats may mean nothing if they don't have

meaning to the residents who own and occupy the land. And even if they have meaning, the program won't sell if it's marketed with values and idioms that don't resonate.

Several kinds of community-based organizations have proven effective managers of microhabitat programs, including land trusts and local environmental, educational, and advocacy groups, including chapters of larger organizations (e.g., National Audubon Society). Other suitable groups, less strictly tied to biodiversity conservation, may include those that focus on environmental justice, urban planning (or "greening"), watershed associations, soil and water conservation districts, and local agencies dedicated to climate adaptation.

Groups dedicated to human welfare often see the need for microhabitats more immediately and tangibly, because they often form after people are already suffering. In those organizations that prioritize biodiversity and land protection, there can be a reluctance to develop microhabitat programs when there is still significant open space left to be saved from development. However, when the lands they have already conserved are small and/or isolated, the effects of habitat fragmentation often begin long before species disappear from those preserves. Where those preserves cannot be made contiguous with additional land protection, then it may be strategic to develop a microhabitat program to keep wild species populations connected. In addition, a benefit these organizations often realize is that microhabitat programs widen the diversity of their supporters, expand their membership, become more immediately relevant to the community at large, and attract additional funding.

Woodland phlox, Phlox divaricata, forms an attractive microhabitat ground cover in its native range. Source: Village and Wilderness

Popularity versus probity

Microhabitat creation is still in the early stages of becoming a movement. It is replete with the confidence of its proponents and the enthusiasm of the converted. I suspect there is a pattern among most movements where eventually some flaws are discovered, promises go unmet, and exaggerations become embarrassments. Once a movement becomes popular, there are always detractors who will enjoy casting doubt upon it … and then the movement goes into a phase of reflection, correction, and recovery. Perhaps the best guard against this fate is for us to build programs that evaluate goals from viewpoints outside of our own perspective, and to objectively evaluate the efficacy of our methods and the impact of our results. In short, to be professional. Here are a few areas of concern already on the horizon:

- *Ecological traps*. When a yard draws pollinators and other wildlife into a haven within an otherwise lethal landscape, we can unintentionally create an "ecological trap." The wildlife appears more abundant, but we're depleting their populations if, for example, neighborhood cats get the birds, or neighbors' pesticides kill the bees. One way around that is to make sure we don't just attract species to our yards, but that they breed in sufficient numbers there to outweigh the mortality inherent in the fragmented landscape. But is this being achieved?

- *Inviting disease vectors*. Brush piles and leaf litter can be essential features to support deer mice (important prey species for many predators) and many invertebrates. But deer mice and other small mammals are hosts to pest species such as deer ticks, and leaf litter can function as winter cover for them. Cutting lawn grass short and not letting leaves accumulate where people are can reduce exposure. But can improved microhabitat practices avoid building up pest species populations in the first place?

- *Fire*. In arid regions, fire is natural, and many native plants are adapted to it—some even depend upon it. However, common "fire-wise" advice is to keep a well-watered lawn around the house, the antithesis of water management and microhabitat goals. Are there ways of arranging the native plant landscape to both minimize fire risk and provide habitat?

- ***Green gentrification***: Yard trees make neighborhoods more attractive, and research has shown that sites within "green neighborhoods" can fetch higher sale prices for the home seller and more tax revenue for the city. The results, however, can be a higher tax burden on low-income residents and an influx of more buyers able to pay higher home prices—effectively displacing long-time residents. Gentrification is not a new phenomenon to urban planners, but how can microhabitats help underserved communities without unintentionally displacing them?

There are probably many ways of solving these and other problems, but pretending they are not a concern is not one of them. While there is little doubt that the benefits of renaturalizing the fragmented landscape far outweigh any downsides, addressing these thorny issues is also part of the microhabitat future. Fortunately, not every community faces all of them, thus each program that is customized to its own community will invent or adopt strategies that others can emulate.

Who this manual is for

First, this manual is written for community-based organizations, whether established or starting up, that want to create microhabitat programs. Secondly, I hope this manual will take a small burden off those programs that often serve as mentors to startups. While some programs have the capacity to offer guidance (Conservation@Home even offers a template), most are stretched thin simply running their own programs. I hope this manual can save these mentoring programs time by presenting the basics, and thus reserve their expertise for when it is needed most.

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This manual is a guide for programs that meet with stewards in person, customize habitat recommendations to the individual site, and maintain a relationship long enough to help the stewards achieve their goals. That relationship may take the form of certification, financial or technical assistance, or offering peer networks or other support. Many organizations promote microhabitats and offer good general guidelines and even local information, such as where to acquire native plants. These efforts can serve as standard-bearers for the movement. However, the "hands-on" programs are necessary to make a sustained ecological and social impact within communities and across landscapes.

Yard stewards earn their certification and signage. Source: New Hope Bird Alliance

Hands-on programs take many forms, but most commonly they are run by paid staff, volunteers, or both. Most are run by nonprofits, but some are conducted by government agencies, such as soil and water conservation districts. Each has its merits and a legacy of impressive achievements. Most are initiated by social entrepreneurs, creating or working within small, community-based organizations—dedicated and innovative, but often insufficiently networked. Few of them can find experienced program leaders to consult, and few of those leaders have the time to mentor startups. That is why this manual is intended to help startup, hands-on programs, be they with volunteers or paid staff, independent or hosted by an organization.

Because no two ecosystems are alike, just as no two organizations are, no manual can provide the level of customization necessary to design a program for any one community. However, while this manual is intended to address some of the fundamentals for most startups, we recognize that there are few if any, universal "best practices." Instead, there are multiple strategies a program can adopt, adapt, or invent to suit its ecosystem and community. For some examples of strategies and templates that established programs have developed, please see the "Manual and Supplemental Resources" page of our Resource Center on the Village and Wilderness website.

According to the UN, by 2050, six billion people are projected to live in cities, requiring over 460,000 square miles of land. As cities sprawl to accommodate this growth, so too will agricultural areas to support the people. Landscapes everywhere will continue to become more fragmented and, because of climate change, will struggle to support the ecosystem functions on which both people and biodiversity depend. We hope that microhabitat programs will proliferate to compensate for some of these changes and that this manual will help you develop an impactful program for your community.

Laying the Foundation— the Strategic Plan

Having interviewed successful microhabitat programs around the country, it's clear that a number of them started with a plan. Sometimes the plan was adopted from another program, and other times developed from scratch, but most plans evolved with experience. That said, it is surprising how many did not start with a plan. Often we'd hear stories about how an organization started on a tangential project but then discovered the demand for and benefits of a microhabitat program. For example, one organization developed a plant nursery for restoration projects. They then discovered many community members wanted native plants to renaturalize their yards, and that donors wanted to support the effort. Thus, a microhabitat program was born. In another case, an organization was helping conservation partners manage wildlife on their preserves, which led to managing wildlife on private properties. This in turn led to providing site stewards with native plants and landscaping recommendations to support wildlife. In business parlance, these organizations pivoted.

Given the success of these almost accidental programs, you may wonder why a plan is necessary at all. The reality, I suspect, is that some poorly conceived programs died before they even got started. Without a compelling problem and a strategic plan to solve it, they simply never got off the ground, and thus there was no story of failure to be told nor a program leader to tell it. For comparison, over 20 percent of new businesses and 30 percent of new nonprofits fail within their first year (depending on your reference, the figures could be higher). I believe those microhabitat programs that succeeded either started with a solid plan or successfully pivoted from another initiative. I also believe that those organizations that pivoted probably could have saved themselves much anxiety, labor, time, funding and credibility had they started with a good strategic plan. A strategic plan ends with specific practices, but it starts with a clear purpose.

This thriving pollinator garden overlooks a public sports park. Source: Village and Wilderness

Purpose

The foundation of an effective strategic plan is a clear statement of purpose. What is the problem to be solved? Microhabitat programs can address multiple issues, but not all of them equally in the same area or for all its residents and species at the same time. For example, some programs lean toward biodiversity conservation, some toward restoring ecosystem services, and some toward climate adaptation. An almost guaranteed way to disappoint your stakeholders is to imply that your microhabitat program can be all things to all people. It is equally important to make sure the problems you identify are those that a microhabitat program can meaningfully help solve. In short, you will have to narrow the field of possibilities based on several variables, including:

- What ecological processes are impaired, whether for biodiversity, ecosystem services, or social benefits?
- What is important to your stakeholders?
- What are other organizations and agencies already adequately addressing?
- What capacity, talent, and resources can your program deliver?

This does not mean that your program is locked into any one purpose or role. Indeed, program evolution may be expected following experience—but that evolution will be much easier if your program builds from a solid foundation and early success.

A clear statement of purpose predisposes success in four ways:

1 It tells people why they should join you in your efforts.

2 It manages stakeholder expectations; it sharpens focus but doesn't over-promise.

3 Your purpose is the foundation for everything from your goals to the strategies to achieve them, to how you staff your program, to who funds it.

4 Your purpose is your North Star. It will help you gauge whether your program is on course or needs to be adjusted.

Everything flows from purpose.

Most fragmented landscapes present multiple problems, many of them linked. Let's say, for example, that the immediate problem your community suffers is flooding from road and roof runoff. Equally important but less tangible to your stakeholders may be the impact that runoff has on groundwater and surface water quality. If the solution to these linked problems is a network of private rain gardens and municipal bioswales, then you might incidentally (but ineffectively) address a different problem: providing native wetland plants to boost declining pollinator populations. There is less credibility and impact in a solution that promises to solve all problems versus a solution that focuses on a predominant one—in this case, water quality—even though it might have ancillary benefits for pollinators.

A native plant "demonstration garden" located in a high-visibility area. Source: Village and Wilderness

Some common problem categories are illustrated in Table 1. Note that not all subcategories are necessarily linked or solved by the same microhabitat solution.

Table 1. Three common problems and examples of focus		
Reverse biodiversity loss	**Restore ecosystem services**	**Provide social benefits**
• Groups of organisms (e.g., pollinators, native plants, birds) • Targeted species (e.g., Monarch butterflies)	• Urban heat island effect • Flooding • Road runoff • Fire hazard • Pest species management • Disease management • Soil development • Watershed protection • Pollination	• Natural aesthetics • Education • Personal and family enjoyment • Mental well-being • Building a culture of stewardship

Making the pitch

Once you've landed on a core purpose, you will need to ask people in leadership for permission or help, be they the administrators of an established organization, a municipal board or influential community members. To start a program, in addition to getting their approval, you may be asking them to contribute time, labor, funding, or other resources. To do that, you will need to make a compelling case statement, "the pitch." Probably many compelling case statements are developed first with a small core group, casually shared with a trusted member of leadership for feedback, and then revised. Ideally, however, the pitch will be delivered before the core group becomes wedded to a particular idea on how to solve the problem. That way, you can engage the leaders in developing the strategic plan, and thus achieve their buy-in at the outset.

It may be easier if you are only proposing to start a pilot program to test the concept. That allows leadership to voice what constitutes success from their point of view and provides them an out if the program fails. Regardless of how the details of a strategic plan developed, the proposal for a pilot program should have some basic rationale in place, including an important problem; the means to solve it; reasons why doing so are aligned with the interests and capacity of the organization or the community; and plausible access to the necessary materials, information, labor, and funding.

The most difficult audience can sometimes be the leadership of well-established organizations, and there are good reasons for this. One is that many have seen conservation paradigms and priorities shift over the decades. As microhabitats become increasingly popular there may be good precedent for them to be skeptical of their importance and staying power. You should be prepared to help them weigh their concerns against the potential advantages of starting a microhabitat program (Table 2).

Table 2. Common concerns over starting microhabitat programs

Concerns	Potential advantages
Will a microhabitat program detract from our core mission, such as protecting the last remaining open space in our community?	Populations of some species on conservation lands are already isolated due to fragmentation and should be ecologically reconnected before more biodiversity is lost.
Will it dilute our branding and reputation?	A backyard habitat program can expand and diversify our membership
Will it impact funding from our limited number of donors?	A new donor has offered to subsidize a pilot program until it gains enough support to be self-sustaining
Do we have the staff with the right expertise?	We can start with part of one staff person's time and a couple of trained volunteers
What constitutes success and a determination of whether to continue the program or not?	We will collaboratively develop goals and benchmarks by which the organization can make this determination at an agreed-upon time

While established organizations may take some convincing, compared to independent startup programs they can often leap years ahead in developing a microhabitat program. After all, they already know their community and have the credibility, infrastructure, administration, fundraising machinery, and staff to operate it.

That said, informal volunteer-based programs may be adequate for street-, neighborhood-, or homeowner association-scale projects, where the volunteer stewards are doing the work (be it on their own or each others' properties) and covering the expenses. (Formal volunteer programs have proven capable of achieving goals and scales equivalent to funded programs.) Again, making a pitch in these situations is often organic, starting with a core group and building out in widening circles to friends, neighbors, and others. Leadership in this case may be composed of two parts: 1) influential community members and groups, such as the grounds committee of a homeowners' association, and 2) prospective volunteers. Common concerns for the volunteers may include individuals' available time and any legal or financial obligations. It is best to be realistic. A program may have a relatively large number of volunteers and willing site stewards, but often the work falls to a much smaller core group. Common concerns for community leaders may include aesthetics, pest species, property values, maintenance costs, and, especially in less affluent neighborhoods, safety (think falling trees or cover for criminal activity). It will be helpful to give likely concerns some thought before making the pitch to community leadership and prospective volunteers.

Making the pitch to create a new nonprofit organization, volunteer-run or not, requires much more formality. There are financial, legal, and other consequences. Often, the pitch will be directed to a core group who will:

- Form a Board of Directors
- Develop bylaws
- Incorporate the organization
- Obtain tax-exempt status
- Register with State authorities
- Develop a strategic plan
- Set up accounting and financial management systems
- Recruit staff and volunteers
- Develop policies and procedures
- Promote the organization

There are many online sources to guide the formation of a nonprofit, as discussed in Part III. It may be easiest to consult with an attorney at the outset to reduce the amount of learning you and your core group will otherwise need to do.

Priorities

Once you've convinced leadership that there is a compelling purpose, the next step is to engage them and all other stakeholders in elucidating what specific problems are most important to them. Some problems, such as stormwater flooding, are more obvious to a lay audience than others, such as pollinator decline. The more a problem impacts community residents, the easier it will be to convince them to participate. That doesn't mean you should avoid less conspicuous problems if they are indeed the most important. It may simply mean that your plan will need to incorporate an educational campaign. Consultation with and testimonials from experts (ecologists, urban planners, conservation peers) can help validate critical issues, and a listening tour of the community and local thought leaders can reveal where education is needed to bridge a gap.

A listening tour can be as formal as mediated focus groups or as informal as chatting with neighbors over coffee. In either case, it is important to make sure that there are comparable results from those you interview. Here are some pointers to consider, depending on how large the stakeholder group is and how formal you want a listening tour to be:

- Identify stakeholders who are most impacted by the problem, who influence what can be done about it, and who control the messaging to the larger community.
- Ensure a diversity of voices and demographics for equitable representation.
- Establish a timeline that covers all relevant areas and allows sufficient time for meaningful engagement.
- Choose accessible venues, such as community centers, schools, parks, or local businesses.
- Plan sessions at different times of the day and days of the week to accommodate various schedules.
- Engage speakers native to the neighborhood and culture, and establish ground rules for respectful and constructive dialogue.
- Use note-takers, audio/video recordings, surveys, and feedback forms to document the discussions.
- Consider using digital tools, such as online surveys or interactive apps.
- Organize feedback into themes or categories.
- Identify the most pressing concerns and common themes.
- Prepare a summary report and share what you heard with the community. This can be done through public meetings, newsletters, social media updates, or a dedicated website.
- Seek validation from the community to ensure their concerns are accurately captured.

> **Whatever priorities you select, they should be those that microhabitats can significantly impact and with results your program can realistically deliver.**

It is important to confine the discussion to the problem you want to solve and why you want to solve it; otherwise, you may invite a wandering discussion. You are trying to learn if, how, and to what degree the problem manifests itself to your stakeholders. The issue may not be a problem at all to some, and that's valuable information too—it means you've got some educational work ahead of you.

Whatever priorities you select, they should be those that microhabitats can significantly impact and with results your program can realistically deliver. For example, the occasional rain garden may capture and filter roof runoff, but not control neighborhood stormwater flooding (unless the rain gardens are concentrated in enough numbers, as in some neighborhoods). That may be a task best suited to urban planners. However, a scattering of small patches of diverse native plants can indeed boost populations of pollinators. You will not likely persuade stewards or funders to continue supporting a microhabitat program if the practices you advocated did not meaningfully contribute to the solution.

Knowing what problem you want to solve is one priority, but an equal or greater one is who you want to solve it for. I have deliberately used the abstract word "stakeholders" to embrace not only the people who will benefit from your microhabitat program but also any other community members who can influence its success. Despite best efforts at objective analysis, some programs may implicitly prioritize affluent

> **Knowing what problem you want to solve is one priority, but an equal or greater one is who you want to solve it for.**

neighborhoods and stewards (read "potential donors") over those stakeholders who most need the program's benefits. It is an understandable and possibly common logic. First, we will build a financially stable program with those who can support it; then we can afford to expand the program to under-resourced neighborhoods. Some do, but several programs report they did so only after their supporters, staff, or board members became embarrassed by the inequity.

One program avoided this by starting in its more congested, working-class neighborhoods, rather than the wealthiest ones with the largest lots and most biodiversity. Their strategy wasn't about economics, it was about acceptance. It was feared that, if the program was associated with the socioeconomic elite (the donor class), the less affluent would scorn it as something only the wealthy could afford to participate in. Instead what happened was that the affluent stakeholders learned of a program that appealed on two levels: it benefited people as well as nature. By the end of the program's first year, the program had enrolled over 100 sites, totaling over 400 acres, and spanned the socioeconomic range of the community.

> **Consider equity at the outset, not in hindsight, and don't assume that it is a program luxury.**

There is not enough evidence to say that a similar approach will work for your community. Rather, the lesson is this: when prioritizing stakeholders, consider equity at the outset, not in hindsight, and don't assume that it is a program luxury.

Goals

Once you've picked your priorities, it is time to identify your goals. There are two different kinds of goals, organizational versus mission-oriented. Organizational goals include such things as the number of members, funds donated, institutional reputation, and so on. Mission-oriented goals are the intended results directly related to the problem you're trying to solve. Both kinds of goals are important but don't conflate the two. For example, if your intended result is to increase the number of pollinators in your community, then the number of donors you have gained may be important to the organization but not relevant to the goal. A better goal might be, for example, "to enlist 100 yards in providing season-long native flowers, dead wood, and bare soil to increase the pollinator population." (Later, I'll discuss metrics, which are how you see if the goal had a meaningful impact—in this case, increasing pollinators.)

It is more credible and meaningful if the scale of your goals matches the scale of your program. For example, a community-scale program might boost local pollinator numbers and diversity. However, your program may not significantly benefit Monarch butterflies, which suffer from continental-scale problems, unless your community is within the migratory or breeding range. Sometimes, large-scale solutions can indeed contribute to solving large-scale problems, but to prove impact you need to pool it with data from other areas. The most credible goals are ones relevant to your area and validated by experts, stakeholders, and peers—such as local naturalists, academic ecologists, and conservation agencies and organizations.

Goals will ideally be achievable within a period that does not exceed the attention of your early stewards. However, sometimes goals are constrained by seasonal and biological realities. For example, it may take only a couple of years for milkweed to attract Monarch butterflies, but a decade or two may pass before street trees measurably cool a neighborhood. If shading is necessarily your priority, then you may want to pick sequential goals to show progress—such as the number of trees planted, the number that survived the first year, or the number of neighborhood volunteers tending them. It's fortunate when the results are readily apparent (e.g., when Monarchs show up), but sometimes the evidence needs to be collected and presented. For example, water testing data can detect declining pollution levels in the local watershed.

It might be tempting to set undefined goals, such as "We'll enroll as many sites as we can," but neither you nor your stakeholders will have any way of gauging whether the program is succeeding or needs adjustment. Rather than avoid setting goals out of a concern that you may not reach them, set goals that are high enough to be meaningful but low enough to plausibly exceed. To "under-promise and over-deliver" may be common wisdom, but it has practical advantages in a program's early stage. Likely, a real value of setting goals will be the lessons you will have learned in trying to achieve them.

Site stewards review a plan for their new native plant landscaping. Source: Openlands

Scale of operation

While some programs operate on a site-by-site basis, most goals require multiple sites to achieve a meaningful impact on biodiversity, ecosystem services, or social changes. For example, increasing the number of pollinators in a single yard may engage family members in the principles of nature stewardship (social change). But unless those pollinators are both breeding and increasing in variety, little will have been added to pollinator diversity and abundance (biodiversity), and unless they are visiting wild plants in other places, little will have been achieved for pollination (ecosystem services). Depending on its priorities, your program may need to work at more than one scale to achieve the intended impact. Table 3 illustrates some examples of how scale may be relevant to different categories of purposes.

Table 3. Examples of program goals and scale and purpose

SCALE	PURPOSE		
	Biodiversity	**Ecosystem services**	**Social benefits**
Individual site (e.g., yard or public space)	Increase pollinators	Redirect and filter drainage	Engage family members
Neighborhood (e.g., multiple nearby sites)	Increase amphibian habitat	Reduce air pollution	Provide respite in public spaces
Landscape (e.g., multiple nearby neighborhoods)	Increase bird populations	Reduce pests and pathogens	Grow a culture of stewardship

Strategies

Your goals are the what of your program, and the strategies are the how. Once you identify the goals, then come the questions: who needs to do what, and what will they need to do it? The answers are your strategy. This may seem an obvious sequence, but sometimes conservation initiatives launch in reverse order, starting with a preferred strategy and then accepting whatever the results happen to be as the goal. That's like shooting an arrow into the woods and then saying whatever tree it hits was the target.

To put it plainly, some microhabitat programs start with understandable enthusiasm over native plants, and tout their many benefits from supporting pollinators to conserving water. If those benefits are the priority in your area, then advocating for more native plants may indeed be the best strategy. However, if your stakeholders know there are higher priorities, then pushing native plants may appear as a distraction. Native plants are foundational for the vast majority of microhabitat programs, but they are not a universal cure-all. In other words, don't start a program promoting native plants unless you are sure they will solve the problem you and your stakeholders have prioritized. Effective strategies are the result of a clear-eyed analysis of what is important, and developing strategies customized to those goals. Table 4 gives some examples of goals and general strategies to achieve them.

Table 4. Examples of goals and strategies

Goal	Generalized strategy
Protect plant diversity	Plant local species with limited seed and pollen dispersal; remove invasive plants
Increase pollinators abundance and diversity	Provide season-long nectar sources, host plants, dead wood, bare soil, and mud
Increase songbird abundance	Plant species that produce the most insect biomass in your ecoregion, such as oaks; keep cats indoors; eliminate dense ground cover near bird feeders; provide water
Increase raptor abundance	Provide owl nest boxes; brush piles; and peregrine nest platforms in cities
Increase bat abundance	Install breeding boxes, hibernacula; provide water; cease broadcast insecticides
Increase snake abundance	Install cover boards, brush piles and dense plantings for prey, hibernacula, water

Increase amphibian abundance	Install wetlands and fishless ponds, terrestrial cover
Increase dragonfly abundance and diversity	Install shallow fishless ponds
Increase firefly abundance	Reduce outdoor lighting, leave the leaves, plant dense and diverse native plants, and eliminate pesticides
Increase Monarch butterflies	Plant milkweed and a variety of native nectaring plants, including late fall blooming plants to support migration
Increase small-game abundance	Convert agricultural margins to native vegetation for species such as quail, turkey, rabbit
Decrease ticks and other disease vectors	Landscape with short, drought-tolerant native grasses, shrubs and wildflowers; increase diversity of vector predators (e.g., some birds) and competitors (other invertebrates)
Improve soil nutrients and microbe community	Plant a diversity of native plants; cease tilling, soil amendments, biocides, and fertilizers
Protect groundwater and surface water	Install rain gardens or vegetative buffers; avoid fertilizers and biocides
Reduce flooding	Create bioswales along roadside verges, parking areas, and other impermeable surfaces
Provide shade	Plant street-tolerant native trees not susceptible to exotic diseases and pests
Mitigate air pollution	Plant street-tolerant trees, especially conifers
Increase access to nature	Create microhabitats in public spaces and vacant and deconstructed lands
Develop a culture of stewardship	Citizen science/monitoring; mentoring; development of community projects and schoolyard projects
Improve human well-being	Design landscape for safety, tranquility and biodiversity

Themes

In the introduction I said that a strength of community-based programs is that they can customize their recommendations to the ecosystem, the neighborhood, the site, and the steward's predilections. However, for a program to have coherency, it needs to make recommendations along some consistent theme. Otherwise it can look like a mishmash of practices with no clear priorities or goals. When they are coherent, programs tend to recommend practices along one of three themes.

- *Standardized practices*. In this approach, a program may require stewards to undertake the same sort of practices (e.g., remove non-native invasive species or plant native ones) or cease other practices (e.g., use of biocides and outdoor lighting, letting cats outdoors). The scale is the individual site, be it a yard or a public space. The advantage of this approach is that the standards are uniform and it is relatively easy to determine if the site is eligible for certification. One downside is that not all sites are large enough to accommodate some practices. Either these sites are disqualified from the program, or the program needs to develop different standards for different categories of sites, e.g., a large lot versus a balcony garden. Even then, not all site stewards—regardless of how earnest they may be—are financially or physically capable of completing some standardized recommendations. Effectively this means some sites may be disqualified. Another shortcoming of this approach is that, while the recommendations may be followed, it can be difficult to tell if intended biodiversity results were achieved. For example, if native plants are recommended to support pollinators, one might indeed observe more pollinators in a yard but have no idea if they are successfully reproducing there or have been lured into an ecological trap. Other intended results, such as ecosystem services or social goals, are usually easier to measure. For example, a site steward will know if a rain garden helped redirect roof runoff or if her family is enjoying a backyard nature connection.

- **_Targeted goals_**. This approach does not require standardized practices but capitalizes on what a site may contribute to a specific goal. Examples include biodiversity goals (e.g., increase the population of a bird, bat, or insect species), ecosystem services (e.g., control flooding, air pollution, or heat stress), or social (build a culture of stewardship). The scale for these goals is usually larger than the individual site and therefore must operate at the neighborhood or landscape scale. An advantage to this approach is that the goal is very clear and it lends itself to measuring success—for example, whether the bird population increased over time or not, whether the flooding was mitigated or not, whether community support for conservation has increased or not. A disadvantage is that some sites cannot meaningfully contribute to the goal because they don't present the right conditions in the right places. That is, a given site may not be conducive to a target species, offer space for water retention and filtering, or be owned by someone in the community.

- **_Optimized sites_**. This approach asks what the highest impact is that a given site and steward can contribute toward priority goals, sometimes in descending order. For example, there may be a priority species in the landscape, but if a site offers no meaningful opportunities to support it, then the field technician may recommend practices for a species that is a priority for the neighborhood. Failing that, the field technician may recommend practices that promote general biodiversity at the yard scale. An advantage to this approach is that it maximizes a site's impact within the largest possible context, and it can also accommodate specific target goals. A disadvantage is that it is the opposite of the standardized practices model: because each site's recommendations are customized, measuring the impact needs to be done as well, be it at the site, neighborhood, or landscape scale.

Which theme works best for your program will depend on the overall problem you're trying to solve and the priorities, goals, and strategies you and your stakeholders can address.

Part II

Operations

Funding

If your program is part of an established organization, it may already have a routine source of funds, relationships with funders, and a fundraising method. In that case, the issue you may face is not only how to raise funds or from whom, but how to do so in a way that does not create internal competition for the dollars.

It can be difficult for an organization to take on any new program unless it comes with additional funding, preferably from a new source—that is, one that wouldn't otherwise support the pre-existing priorities. It can be hard for some organizations to conceive of, let alone cultivate, new kinds of funding. For example, municipal agencies may be familiar with State and Federal grant programs, while nonprofit organizations often excel in cultivating individual donors and family foundations. As an entrepreneur who wants to create or sustain a microhabitat program, it may be incumbent on you to identify plausible new funding from an unfamiliar source.

While there are hundreds of public and private funding sources, few of them are available to many community-based organizations or, more specifically, microhabitat programs. Many foundations operate at a national or international scale, work in other regions, serve different purposes, or have proposal deadlines that seem always to have just passed. It can be very frustrating to sort through seemingly perfectly aligned foundation missions only to find their criteria don't apply to your program.

Among the programs we have interviewed, local funding is by far the most common type, as might be expected for community-based organizations. However, the nature of the funding can be quite different between communities. In affluent communities, large donations from family foundations, high-net-worth individuals, and program stewards are common. In less affluent areas, community foundations and municipal funding take on a greater role. At the county level, State funding (e.g., departments of conservation) and Soil and Water Conservation Districts begin to play a larger role, especially in more agricultural areas. Some communities with regionally or nationally important conservation areas may qualify for funding from national sources, such as the Bureau of Land Management or the National Fish and Wildlife Foundation. A very small percentage of funding comes from corporate donors and partner organizations. Many programs are supported by a blend of funding sources, which confers stability. Below are a few examples of funding sources that have supported some programs.

- *Soil and Water Conservation Districts*. There are about 3,000 Soil and Water Conservation Districts (SWCDs), typically organized at the county level. A directory can be found here. Their goals and programs are highly variable. For example, some serve as outreach and advisory programs, others function as land trusts, and many serve multiple roles. An SWCD's inclination to support a microhabitat program can depend on many things, including the goals and limitations of their funders. For example, a rural SWCD that is funded by tax revenue may be largely focused on the priorities of their tax base—farmers, for example. An SWCD that encompasses an urban area and is supported by Federal and State grants may need to fulfill various roles to be eligible for funding, such as watershed protection or helping underserved communities. You may find common ground with similar strategies, albeit for different goals. For example, farmers may want more pollinators for their crops, which would serve wild plants as well. Or an SWCD may be obliged to serve low-income communities to receive their funding but not have the staff capacity to do so. Instead, it may decide to fulfill that role by funding your microhabitat program.

- **National Resources Conservation Service**. The Natural Resources Conservation Service (NRCS) primarily focuses on providing technical and financial assistance to farmers, ranchers, and private landowners. While their primary mission is not centered around microhabitats, some have funded local conservation organizations or agencies whose programs align with the broader conservation goals of improving soil health, water quality, and wildlife habitat. However, willingness to do so can vary by location and by the priorities of individual NRCS offices. For an NRCS office near you, a directory can be found here.

- **National Fish and Wildlife Foundation**. The National Fish and Wildlife Foundation sometimes provides funding to partnerships devoted to the recovery of a species, an ecosystem, or an important conservation area.

- **Other sources**. While not a funding source itself, one resource for programs that are part of a watershed association is the Watershed Program Portal. This portal provides updated information on Federal funding sources that may be useful for microhabitat programs whose goals include watershed restoration and flood management (e.g., a program that promotes bioswales, rain gardens, and the restoration of impermeable surfaces under the aegis of a watershed association).

Many organizations impose a fee for participation, which helps defray the cost of site visits and recommendations, follow-ups, certification, and so on. At least one program we know of aspires to support itself through plant sales from its nursery. However, these fees and income streams seldom completely support a program, and usually, significant supplemental funding is needed.

Partnerships and collaborations

Many aspects of a microhabitat program can benefit from working with other organizations. These partnerships come in different forms. While we often use the words "partner" and "collaborator" interchangeably in the conservation fields, here we will be more specific. A partner is an organization with which your organization has a formal and legally binding agreement. A collaborator is an organization with which your organization works together toward a common goal, usually informally. (We'll use the looser term "ally" to mean any group or individual that supports your goals, whether actively or just in spirit.)

Partnerships require documentation to establish mutual expectations and accountability, but collaborations also benefit from a written agreement as well. Too often, one party has expectations, only to later discover that they were interpreted differently or could not be fulfilled for reasons no one anticipated—but nevertheless leaving the other party high

and dry without a way to amicably dissolve the relationship. More problematic is that, after both parties have begun working together, issues of inequality and fairness may emerge. For example, let's say both parties apply for a grant and decide to share the funds equally … but it turns out that one party did more work than the other, or one organization's salaries are higher, or one organization is supplemented by yet other funds, or one got more public credit than the other. Few things can ruin a good working relationship, or alienate the community you both wish to serve, like a poorly thought-through partnership. Take the time to work out your expectations in advance, and get them in writing.

Take the time to work out your expectations in advance, and get them in writing.

Caveats aside, there are good reasons to consider collaborating or partnering with another organization. The Backyard Habitat Certification Program (BHCP), serving the Portland (OR) -Vancouver (WA) metro area, exemplifies two of them. One is the partnership between the Columbia Land Trust (which had restoration expertise) and the Bird Alliance of Oregon (which had a larger membership network from which to recruit stewards). The BHCP also works closely with cultural organizations, such as Verde, to help integrate their work with the interests of under-resourced and non-English speaking communities. For more information, see our Case Study. Similar examples of building community bridges may include working with civic groups, faith communities, homeowners associations, watershed alliances, and other conservation organizations that have large memberships. Often, these relationships begin as non-binding collaborations because your program must first earn and maintain trust to work with them and the communities they represent. Later, once trust is built, you may develop formal partnership agreements—for example, if one program provides funding or other services to the other.

Partners may provide resources upon which programs depend, and so their agreements may be quite formal. One example is the arrangement between Polly Hill Arboretum on Martha's Vineyard, which grows and provides native plants, and nearby BiodiversityWorks, which distributes the plants through its Natural Neighbors program. The agreement between the two organizations is facilitated by both parties periodically taking the time to understand each other's capacity and limitations (including which plant species had a good seed year) and adjusting their expectations accordingly. Critically, both organizations share a common goal (protecting the diversity of native plants in their community) and thoughtfully credit each other on their websites and newsletters. That is, they are mutually beneficial.

Even casual collaborations may, upon deeper consideration, benefit from formal and even legally binding partnership agreements. Take, for example, an academic institution that wants to engage your stewards in research to measure the ecological impact of microhabitat practices, or a volunteer group willing to help with invasive plant removal. If the academic institution failed to share the data that your stewards collected, the community may feel disrespected—but blame your program as the partner they know. You may want an agreement to itemize the duties and expectations of each partner. Or, if a volunteer hurts himself or happens to damage private property, you may benefit from a legal agreement that protects your organization from liability.

Please note that when for-profit entities provide your program with goods (e.g., native plants) or services (e.g., landscaping) in exchange for money, those are business relationships, not partnerships between nonprofits. It is important to make this distinction when publicly acknowledging the role of a business or contractor to avoid the IRS private benefit rule. Likewise, consider this rule before endorsing or trading other goods for services or vice versa with for-profits. (Incidentally, if your program is contemplating directly offering goods or services that you might otherwise have contracted, be sure to get legal advice regarding another IRS rule for unrelated business income.)

With the right native plants and features, even container gardens can serve as microhabitats. Source: New Hope Bird Alliance

Staffing and Volunteers

Startup programs often begin with one enterprising staffer who does everything, sometimes with the help of a few volunteers. Eventually, some programs may grow to include many more volunteers and multiple staff, whether they split their duties within the organization (e.g., fundraising and administration) or serve specialist roles (e.g., plant propagators). In most cases, the second staff person to be added to the program is the field technician. Typically the program founder moves up in responsibility and spends less time in the field (to their nearly universal regret)—and thus begins the search for a field technician, who may fulfill several responsibilities:

- Recruit stewards and schedule site visits
- Conduct site visits, identify species and management possibilities
- Write site recommendations
- Verify and certify performance
- Monitor results
- Keep records and write reports for newsletters and funders

Ideally, field technicians are trained naturalists with more than a rudimentary understanding of the local ecosystem, the natural history of targeted plant and animal species, landscaping basics, and the culture of the community being served. These are quite varied skill sets that may take years to develop, so often the field technician plays an introductory role and calls in the more experienced staffer for complicated matters. Some programs employ (or, like Nature at Home, get volunteers from) Extension Master Gardener℠ volunteers or Master Naturalist programs. Other sources include native plant societies. If they come from a program that emphasizes native species, pollinators, and local wildlife, they can be a great resource.

Fortunately, while technical knowledge is important, it may not be the priority when selecting field technicians. As Jim Kleinwachter of Conservation@Home says, the most important skill is the ability to listen to site stewards, connect with them, and shape site recommendations that fit their immediate needs first. Too often highly trained field technicians will be eager to show off their knowledge, forgetting that most site stewards are novices. While eager to learn, they can be easily overwhelmed. Jim says that the field technician's first role is ambassador, and good people skills are paramount. When expertise is needed, veteran naturalists like Jim can be called in as needed. Otherwise, much of the technical expertise can be learned by accompanying more experienced technicians and by using field apps such as iNaturalist or Pl@ntNet. With this perspective in mind, the pool of potential field technicians may expand greatly with volunteers.

Several programs report that a single field technician can average about two site visits per week (about 100 per year). This includes not only the site visit itself but preliminary conversations with the site owner or steward; written recommendations; a follow-up visit and/or correspondence to encourage participation; and verification that work has been completed to qualify for a yard sign. Field technicians often fulfill other roles too, such as conducting educational programs for landscapers, participating in community events, and writing newsletters and reports. While necessary for a holistic program, these activities necessarily cut down on the number of site visits a field technician can do.

In some cases, such as the Backyard Habitat Certification Program, the non-field work is done by full-time staff while the field technician's role was initially performed by contractors who are paid on a per-site basis. (Later, BHCP migrated over to full-time technicians, which they report allowed for a more cohesive and inclusive team.) At the time of this writing, this allows BHCP to enroll about 1,500 stewards per year. Besides increasing the volume of participation, there can be several additional advantages to working through contractors:

- A program could employ multiple contractors so that if one is not available another can fill in. Programs that depend on one or two staff technicians may suffer a significant setback if one leaves the organization.
- There is a larger pool of potentially trainable technicians, such as Master Gardeners, Master Naturalists, local ecologists, wildlife managers, or even commercial landscapers. Some may be retired professionals or have full-time jobs but be willing to work on contract for extra income on the side.
- Contractors are paid by the task and usually don't require benefits as do employees. And, by the IRS code, the program may control or direct only the result of the contractor's work but not what will be done and how it will be done. In other words, they do not require supervision.
- Contractors may be enlisted to work only as needed. For example, they may be hired for the season instead of year-round as full-time employees usually are.

However, this approach may require a training program for all new contractors to ensure uniformity in your program's goals and approach.

Salaries and contract fees for field technicians vary greatly, of course, depending on the local cost of living, employer competition for qualified personnel, and the level of expertise of the individual. At this point, we have only anecdotal information on salaries for full-time, year-round field technicians, but entry-level technicians may range in the $30,000 to $40,000 range while more experienced technicians may fall in the $40,000 to $60,000 range. Contractors may charge at the higher end of this spectrum if they are

already highly trained and need to provide their own insurance and benefits (though some may have them from their full-time employers or, if they are retired, Medicare). Salaries for senior-level program managers—that is, those who oversee field technicians and general operations—are less well documented, but may fall within the $60,000 to $100,000 range. They are usually full-time employees of the host organization. These and other staffing-related costs will be reviewed again in a later chapter on budgeting.

Some programs have had success recruiting volunteers or contractors from Master Naturalist and Master Gardener programs. (Many of these programs are administered by State Cooperative Extension Services, while others by nonprofits. As such, there is no universal directory and you should see what is available in your state.) Master Naturalist and Gardener programs are not uniform, nor do all Masters have an interest in native plants and wildlife. When they do, however, these programs may serve as valuable partners or collaborators.

> Some programs have had success recruiting volunteers or contractors from Master Naturalist and Master Gardener programs.

Some programs rely heavily on volunteers for larger projects, such as Love Your Alley, which operates in the small community of Bexley, Ohio. Some programs, like Natural Neighbors of BiodiversityWorks, have developed volunteer cooperatives to remove invasive plants. When Natural Neighbors stewards need help with managing their invasives, they can join the Invasive Plant Brigade. By volunteering to help other stewards, they earn an equivalent of the group's time on their own property. In other programs, volunteers serve a diversity of roles and evolve into larger, year-round programs like the Wildlife Sanctuary Program, a program of the Northern Virginia Bird Alliance. Perhaps the largest, longest-running, and most effective volunteer-based organization we know is Citizens For Conservation (CFC), which, in addition to other roles, restores forest preserves as a partner in the famous Chicago Wilderness Alliance. CFC has produced an excellent guide to developing a volunteer program, A Healthy Nature Handbook (Pepper and Parker, 2021, Island Press). Other organizations, like Wild Seed Project, also depend on volunteers to collect and clean seeds and grow native plants, as reviewed in our Case Study. It is impressive how a relatively small number of volunteers can have a large impact. That said, most well-established programs have full-time or part-time staff, even if only to manage volunteers.

Training field technicians

As mentioned above, the most important skill set for field technicians is the ability to listen and convey enthusiasm to site stewards, most of whom are novices and some of whom are easily overwhelmed with too much information. Luanne Johnson and Rich Couse of BiodiversityWorks say their highest priority is to help site stewards understand how their sites are special. From a foundation of personal pride and curiosity, impactful site recommendations can be built. Technical skills, such as plant and animal identification, can be learned, but the ability to connect with others can be more difficult to teach. This personal aptitude may be a priority for your program, and, if you are not so fortunate as to find a good field naturalist with those people skills, then the question is how to train good ambassadors.

Fortunately, a growing number of apps can help identify plants and animals on a site, including the following:

All species
- iNaturalist: Identifies most plants and animals using image recognition technology. A free app, iNaturalist allows public sharing of observations. By creating a record it contributes to a larger scientific dataset, and has a large community where users can discuss and verify identifications. Seek by iNaturalist primarily focuses on quick identification with less detailed data sharing, and is designed more for individual exploration.

Trees and other plants
- Pl@ntNet: A community-based app that helps identify plants by analyzing photos.
- Leafsnap: Developed by Columbia University, the University of Maryland, and the Smithsonian Institution, Leafsnap uses visual recognition software to identify tree species from photographs of their leaves.
- Virginia Tech Tree Identification: This app is specifically designed for tree identification and includes detailed descriptions, images, and range maps of over 1000 North American tree species.
- Arbor Day Foundation's What Tree Is That?: This app provides a step-by-step guide to identifying tree species based on leaf, bark, and fruit characteristics. It's available for both iOS and Android.
- Picture This: A plant identification app with in-app purchases.

Invasive plants
- EDDMapS (Early Detection & Distribution Mapping System): EDDMapS is designed to assist with the reporting and tracking of invasive species. The app allows users to submit reports of invasive plant sightings, which are then verified and mapped.

- **iMapinvasives** helps you report invasive species locations to your online iMapInvasives account by using your mobile device camera and GPS.
- Great Lakes Early Detection Network (GLEDN): This app is designed for the early detection and reporting of invasive species in the Great Lakes region. It includes an extensive database of invasive plants and allows users to submit reports.

Insects and other animals
- Picture Insect: Specifically designed for identifying insects from photos with a detailed database.
- Bug Finder: Identifies various insects and provides detailed information about them.

Birds
- Merlin Bird ID: Developed by the Cornell Lab of Ornithology, it helps identify birds using photos, by answering a few questions, or by bird song.
- Audubon Bird Guide: A comprehensive guide with photos, sounds, and detailed information about North American birds.
- BirdNET: Uses AI to identify birds from audio recordings of their calls and songs.

Reptiles and Amphibians
- HerpMapper: A guide to reptiles around the world.
- Snake Snap: An identification guide to snakes of the Southeastern United States.

Of these groups, one of the most important for the field technician to identify is the non-native invasive species. For many site owners, invasive species may already overwhelm some areas and, where removed, offer ideal space for planting native species. Contrarily, if not removed, they can often reclaim areas where natives have been planted.

One shortcoming of these apps is that most can identify species only during the seasons when they are active (e.g., insects) or apparent (e.g., trees in leaf, herbaceous plants). This is especially true for programs in temperate zones. In time, most field technicians will be able to identify common invasive woody species and vines from their stems and bark in the dormant season. But inventories of invertebrates, migrant birds, and annual plants may have to wait until the warmer months.

Besides species identification, the field technician ideally knows the fundamentals of basic landscaping design, installation, maintenance, construction, rough costs, and sequencing. For example, if heavy machinery is needed for excavation in the back of the site, it may be best to schedule that before landscaping in the front, over which that machinery must travel. Understanding what maintenance will be required can also make a landscape easier to manage. For example, if brush piles are recommended, it is better to plan their location while you plan the shrubs and trees whose trimmings you will deposit there. It is much more convenient if the brush pile is nearby and hidden by the plantings, rather than on the other side of the site.

Some programs promote training by having two or even three field technicians visit a site at the same time. One is the veteran naturalist who walks the site and verbally characterizes the ecological setting and context; identifies species; understands the interests, capacity, and concerns of the land steward; explores opportunities; and has a vision. The second person may be the field technician-in-training, who is taking photographs and notes on the conversation and learning in the process. In some programs a third person takes the photos and notes, freeing up the tech-in-training to more fully engage in the conversation between the steward and the field technician. Other programs, such as Bring Conservation Home of St. Louis Audubon and Nature Advisors of Deep Roots, KC, have built an online course for prospective field technicians. Volunteers must complete this training and pass a virtual test before they are recruited. They will continue learning on the job paired with more seasoned technicians.

In addition to people skills, I would add another personality trait that is a close second: the ability to see beyond what already exists on the site to what is possible. Call it imagination, creativity, or expansive thinking, it is the ability to envision what a site could look like and what species it might harbor. While it is axiomatic to help the site steward start with small and rewarding steps, an effective field technician makes the site steward's journey easy to begin and rewarding to ascend. However, some stewards need to see the potential of the big vision to know what they are working toward. Whether inspired by short- or long-term visions, the most important goal of the field technician is to develop a relationship with the site steward, not simply a landscape plan.

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Safety and liability

Microhabitat programs should be covered by safety policies and insurance to protect field technicians, stewards, and the organization itself. Usually, safety policies and insurance are covered by the host organization, not the individual program, but it is responsible to think about what the program may expose the organization to. This is particularly true if your program will work with children or if volunteers will be using power tools. The specific policies and insurance needs may vary based on the nature of the program's activities, but here are some general guidelines:

- *Liability Insurance*. Liability insurance helps to protect the organization from potential lawsuits or claims arising from accidents or injuries that occur during program activities. This insurance can cover bodily injury, property damage, or personal injury claims. The coverage amount should be determined based on the program's size, its budget, and the level of risk involved in its activities.

- *Worker's Compensation Insurance*. If the program employs staff, worker's compensation insurance is essential to cover medical expenses and lost wages in the event of work-related injuries or illnesses.

- *Volunteer Insurance*. If your program relies on volunteers, consider obtaining volunteer accident insurance to cover injuries or accidents that may happen while volunteers are participating in program activities.

- *Property and Equipment Insurance*. If the program owns or operates any property, such as a native plant nursery, or uses equipment like vehicles, tools, or educational materials, you should have insurance to cover potential damage, loss, or theft of property or equipment.

- *Environmental Liability Insurance*. Counterintuitively, and depending on the site recommendations, you may want to consider liability insurance to protect against claims such as herbicide or oil spills, or exposure of toxic waste that was buried and forgotten long ago.

- *General Safety Policies*. Develop and implement comprehensive safety policies and procedures that address the specific risks associated with your program's activities. These policies should include guidelines for steward safety, first aid protocols, emergency response plans, and risk assessments. As an example of preemptive measures, one organization requires two field technicians for every site visit, especially when the steward is not known.

- *Risk Management*. Conduct regular risk assessments to identify potential hazards and mitigate risks in program activities. Address safety concerns proactively to reduce the likelihood of accidents or injuries.

- *Waivers and Informed Consent*. Stewards should sign liability waivers or informed consent forms before engaging in program activities, acknowledging the risks involved. Consult with legal counsel to ensure that these forms are legally sound and effective.

- *Training and Education*. Provide training and education to program staff, volunteers, and stewards on safety protocols, emergency procedures, and best practices for minimizing risks.

- *Background Checks*. Conduct background checks on staff and volunteers who will have access to vulnerable populations such as children, the disabled, or the elderly.

- *Reporting and Incident Response*. Establish a clear process for reporting accidents, injuries, or incidents and responding to them promptly and appropriately.

- *Compliance with Regulations*. Ensure that your program complies with all relevant local, State, and Federal regulations related to safety, environmental protection, and wildlife management.

If it is not already operating under the aegis of an established organization with insurance coverage, it's wise to design your program with professional guidance. This may include insurance professionals and legal counsel to tailor coverage and safety policies to the unique needs of your microhabitat program.

Recruiting stewards

Before you start recruiting stewards it may be helpful to consider what kinds of sites are eligible for your program. For example, do you intend to focus on densely populated areas with very small lots or might you include large sites in exurban areas? Will you provide the same services and advice to affluent stewards (who hire landscape architects and landscapers) as you do to disadvantaged people? Many programs serve multiple neighborhoods and demographics, from those where only a few square feet are available to, in some cases, up to 10 acres. Whatever your goals, think about who your target stewards are and who is likely to respond to recruiting efforts. That may influence how you recruit them.

One direct way to recruit stewards is to advertise your program in the local newspaper and on radio stations or social media. New programs often worry they won't get many responses; however, more often the problem is they get more than they can handle promptly. Be prepared to have a quick response system in place (email, phone calls, etc.) to at least let people know they are on a waiting list. Examples of sign-up forms created by some programs are available in the "Manual and Supplemental Resources" page of our Resource Center. Develop a scheduling program or use an app to let people know when to expect a site visit. Otherwise, you run the risk of potential stewards losing faith before they have even started.

Preliminary phone interviews can be particularly helpful, albeit time-consuming, because they also allow you to vet the site steward and determine the depth and nature of their interest. (In our own experience, we occasionally got callers who had missed the point of the program, hoping we would subsidize or provide manual labor for their traditional landscaping.) A phone call can also reveal other important information, such as a resident who may become an ambassador in a high-priority neighborhood. It may also be helpful to have general guidelines and a pre-visit survey on your website to help applicants get started on developing questions and ideas before you can conduct a site visit.

As in many endeavors, there is a trade-off between quantity and quality. Compared to advertisements ("high quantity"), one time-consuming but effective recruitment method is to make presentations to garden clubs, civic groups, homeowner associations, and other public venues. One advantage to this approach is that it may give you an in-depth sense of the concerns and interests of the group, as revealed by questions following the presentation. Another advantage is that you will have established personal connections to potential stewards at the outset. Yet another advantage is that you can more cautiously build out your waitlist and not get overwhelmed with requests.

There are many ways to conduct presentations. Some programs organize yard tours, showing off the variety of microhabitats in their program (with the permission of the site stewards, of course). Tours can be powerful if they are also attractive and demonstrate particular practices, such as building brush piles, creating hibernacula, or providing deadwood and bare soil for pollinators. In the North, they are often conducted when flowers are in bloom, wildlife is active, and it is pleasant to be outdoors. It is also a time when a field naturalist can point out many species of plants and wildlife.

Counterintuitively, winter can also be an effective time to recruit stewards—via indoor presentations with growing-season images. One program we know of near the Teton Range, where winter is long and the snowpack is measured in feet, people are eager for a communal event with images of summer. The timing is ideal for two reasons. One, it is often the slow season for the field technicians. Two, it puts yard stewards in mind of changes they want to make, and well in time for spring. (Too often we are inspired to make changes to our yards when things are in bloom, which is not usually the optimal time to plant!)

Depending on the makeup of your community, you may find that you have three categories of stewards with different capacities and needs and, therefore, different incentives: those who need assistance with labor, materials, and expenses; those who are do-it-yourselfers; and those who hire landscape contractors. For example, some programs prioritize low-income neighborhoods. Their residents may be offered free or low-cost site visits, plants, materials, and labor, via presentations in their native language. Do-it-yourselfers may be inspired by a community of peers through social media, and thus encouraged to learn from each other (and, sometimes, engage in a bit of friendly competition). Affluent audiences may be inspired by their opportunity to help the planet, show off their yards, and either subsidize low-income stewards or support your program.

> **The caution to bear in mind is to not let your program's popularity lure you away from your core goals and audience.**

For startup programs, it is often important to first build momentum. In that case, it may be optimal to begin where people ask to participate, not necessarily where your priority neighborhoods are. Eventually, however, you will want to recruit stewards where your program would have the greatest impact on its mission, such as areas of high biodiversity, marginalized communities, and neighborhoods particularly vulnerable to climate change. The caution to bear in mind is to not let your program's popularity lure you away from your core goals and audience.

Katherine Noble, of [Bird Alliance of Oregon](#), is co-manager of the Backyard Habitat Certification Program—one of the most earnestly inclusive programs we know of in the United States. She makes many suggestions for engaging with cultural organizations, including the following:

- If you are working with a marginalized group, make sure you understand their history and the cause of their displacement. In many cases, their perception of your program may not require building a relationship so much as repairing one that was damaged long before your program came on the scene.
- Conduct training for all staff engaging with this group, perhaps every month, ideally with a representative from the community. Ensure that the language you use is inclusive—for example, don't emphasize "backyards" where most residents don't have or only rent them.
- Ideally, employ someone (perhaps a liaison/field technician) from that group who knows and is known to it, and who speaks the language and in the idioms they are accustomed to.
- Be transparent about your program's goals and why you advocate for them but understand that you need to meet people where they are. (For example, one program we know began engagement with a community through vegetable gardens, because food security was both a traditional value and a practical need. From that foundation they were better able to make the case for pollination and thus for native plants and other habitat needs for pollinators.)
- Request and be open to feedback, and adjust your approach as needed.
- Keep enrollment fees low or on a sliding scale.

In time, perhaps the most effective recruiters are those who are already enthusiastic stewards. Again, the key to that is to make their journey easy to enter and rewarding to ascend over the years.

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Scheduling

Scheduling site visits can be time-consuming. Prospective stewards often have only weekends available, hours after work, or other times that are inconvenient for field technicians who might have imagined more regular work hours before they took the job. It is even more difficult to schedule site visits when the field technicians themselves work entirely on a volunteer basis and work around other life responsibilities. This problem is doubled when programs require two field technicians on initial site visits for security reasons. Possibly the greatest disincentive for new stewards is learning they need to wait a month or more for a site visit. Scheduling apps such as [Acuity](#) or [Calendly](#) can often help with this.

Site visits

The purpose of the site visit (sometimes referred to as a consultation, site evaluation, or something similar) is to collect information about the site and its steward. This information is essential to tailoring recommendations that are meaningful to the steward, relevant to your program's goals, and likely to be achieved.

> What information you choose to collect from the sites and their stewards depends on your goals.

It is important to be clear about what constitutes a "site" and who the steward is. This is relatively obvious, for example, when you are meeting with the steward of the site who is also the one who does all the landscaping. It is less clear when you are approached by a homeowner's association representing multiple sites. It is even less clear when the steward is not the owner and may not have the legal right to follow your recommendations. As a practical matter, some programs insist that while they may be willing to address the decision-makers in a homeowners association and discuss common lands, they make recommendations based only on individual sites. (We have not yet heard of a program that requires a signed statement confirming a steward's legal rights to manage a site, much less indemnifying the microhabitat program from liability.)

What information you choose to collect from the sites and their stewards depends on your goals. In most cases, your first site visit will collect "baseline" information. This will likely include a description of the ecological state of the site at the time of your visit, and the starting point against which progress toward your recommendations is compared. This information may be used to determine eligibility for certification or to see if your recommendations indeed delivered the intended ecological results. In that case, your initial site visit may include the presence/absence, location, or quantity of invasive species to remove or target species to establish.

You may also be evaluating the stewards' interests or concerns, their understanding of ecological principles, and their willingness to pursue more advanced goals. The site visit is your first opportunity to develop a relationship with the stewards as they begin their journey.

Because success depends so much on building relationships with the stewards, it is advisable to meet directly with them whenever possible. Intermediaries such as site managers, landscape architects, and landscape contractors may be valuable members of a steward's decision-making team—also, as the professionals doing the labor, a source of very practical knowledge of the site. However, unless those intermediaries have been trained in and are committed to your program's goals and practices, it is understandable

that they may have other priorities and predilections and thus color your recommendations to the site steward. We know of multiple instances where ecological knowledge and goals were lost in translation to the site steward when the technician wasn't present. Sometimes poor landscaping results were blamed on the field technician, or credit for success was attributed to the wrong party. We know of times when the field technician met with a contractor for free, who later charged the client, who in turn declined to donate to the program having "already paid" for the recommendations. But most fundamentally, if you don't have a direct rapport with the steward, you simply cannot develop a relationship.

Preliminary information

Site visits take time, especially if the site is far from where the field technician lives or works. This is doubly true if your program has a policy of sending two field technicians to the site. Site visits generally range from one to two hours in length (not counting travel time) depending on the site's size and complexity and how much information the steward wants to impart or receive. Many programs report that a field technician can do only two or three site visits a week, in part because writing up the recommendations takes so much longer. Most programs develop a waitlist, which some prioritize by financial need or program goals—for example, sites in ecologically important areas. Or, if a site is located a distance away, the field technician may wait until there is another site nearby to economize on travel time.

> Many programs report that a field technician can do only two or three site visits a week.

One way of retaining a site steward's engagement until the site visit is to request preliminary information via website signup. Such information as address, assessor's map, lot number if they know it; contact information; what interests or concerns them (e.g., pollinators, native plants, flood control, etc.), and an available time for a phone interview. This can also save a lot of the field technician's time. However, don't insist on information that the steward may have trouble finding. Make each step as easy as possible.

A second step can be the phone interview, which can serve three purposes. One, it can allow the field technician to determine if the applicant has a clear understanding of and interest in the program's goals. If not, then they may be referred to another resource—perhaps a landscaper or pest control officer—to address their real interests. Two, the field technician can often learn a lot about the applicant and the site, saving time during the visit. Three, the field technician can explain why there is a waitlist for the site visit, if there is one, and then schedule one.

In advance of the site visit, the field technician can gather from the assessor's maps preliminary information such as the site's lot size, number, and type of structures, as well

as its location in the surrounding neighborhood. Satellite and roadside images of the yard and the neighborhood gathered from an online search engine, can give a good idea of the site's potential for supporting different species or its suitability for various practices. For example, a very shaded area may not be suitable for a pollinator garden, but lots of impermeable surfaces may suggest the utility of a bioswale or rain garden. When making a site visit for the first time, visual aids are often much more informative to the novice site steward than a lot of printed information. Examples of mappable and satellite information to gather before the site visit may include:

- Site location
- Housing/structure density
- Heavily trafficked roads
- Nearby disturbed, weedy, or toxic areas
- Closest green spaces and/or natural lands
- Closest natural waters and wetlands

Information gathered on site
Depending on the season and the field technician's skills, much ecological information may be gleaned from the first visit. A field technician can determine if a subsequent visit by a more experienced field technician or during the growing season is warranted. However, some basic categories of information are useful for most recommendations, be they biodiversity or ecosystem service goals. Many of these can be mapped, including:

- Aspect, sun exposure/shaded areas, slope, drainage
- Areas of native plants and their species
- Tree canopy, shrub, and herbaceous layers
- Invasive plants
- Lawn and impermeable surface areas
- Evidence of toxic areas, such as weed-free lawns
- Outdoor cats or feeding stations
- Presence/absence of water
- Presence/absence of dense cover and brush piles
- Locations where species of interest have been seen (such as birds, pollinators, reptiles and amphibians, bats, etc.)
- Problem areas: poor drainage, hot areas, fire hazards
- Current and intended future uses, such as the location of structures yet to be built

This information can help you and the site steward decide not only what practices to implement, but where to locate them.

Understanding the steward

Mappable and quantifiable information will help you understand and explain the site's potential and where your recommended practices can be applied. However, you will also need to collect qualitative information to customize your recommendations to the steward. This includes:

- **Interests:** favorite views, water features, birds, butterflies, pollinators

- **Concerns:** use of herbicides and other biocides; aversion to some species (e.g., ticks, spiders, bats, snakes, poison ivy, etc.); neighbor problems (views, noise, trespass, outdoor pets); fire hazards and flooding

- **Capabilities:** If the steward is a do-it-yourselfer, what skills and aptitudes does she have? How much time? If she hires landscapers, are they familiar with native plants and wildlife management? Does she need financial assistance or help with manual labor?

- **Other stakeholders:** Who else will use the site, such as visiting grandchildren, and what might the steward want to provide for them, such as educational opportunities? How do the neighbors or the homeowner's association feel about a re-naturalized landscape?

If the field technician is a good listener, she will sense when the time is right to introduce the site steward to increasingly detailed information. From our own experience, the kind of information that most deeply engages a site steward at this stage conveys the following:

- **Your site is special.** Point out native plants that are already established; interesting pollinators, birds, or other species; and unique aspects of the site compared to those of neighbors, e.g., slope, soil, sun, undisturbed areas, etc.

- **Your site has exciting potential**. Help the steward visualize how some practices harbor additional biodiversity, solve problems such as roof runoff, offer aesthetic benefits, or provide for family enjoyment, participation, and nature education.

- **It's very easy to start**. Suggest an early first step and, if necessary, where to get help, native plants, and other materials. Leave other steps and details for the forthcoming recommendations. Don't mislead by implying that the grand vision may come soon, but convey that every step in the journey can be enjoyable, achievable, and rewarding.

In our interviews with site stewards, we have often found that very few had preconceived ideas of what they wanted to do on their sites. When surveyed to understand topics of interest (such as native plants, pollinators, butterflies, birds, etc.), most people checked most of the boxes. When verbally asked what their site goals were, a common reply was "I just want to do the right thing. I was hoping you'd suggest something." Put one way, if they engage the site steward well, field technicians can have a great deal of influence on the site. Put another way, it is incumbent upon the field technician to listen carefully to the stewards for interests and inclinations that they may not have yet formulated themselves.

Fees

Most programs notify site stewards what the fee will be before scheduling a visit because even a nominal fee can be surprising if all the steward sees is the time spent in their yard. Besides the site visit itself, there is the time and expense of travel, often followed by three times as many hours analyzing and writing up the report and recommendations. Because of all this, not many programs charge the full cost of the site visit, as it would be off-putting to the new steward. Some programs offer a sliding scale fee, depending on the reported resources of the steward, and some charge nothing for low-income stewards (or those living in low-income neighborhoods). This poses two issues, however, one of which is the awkwardness of acknowledging a steward's wealth (which often requires self-reporting). The other is that by charging a lower-than-real-cost fee, one is essentially subsidizing affluent stewards who could well afford it. One workaround is to make all visits free or low cost but invite stewards to donate an amount to subsidize site visits for those who cannot afford them. While we do not have any figures to report, anecdotal evidence suggests that affluent stewards are often moved by the opportunity to anonymously help less affluent community members. The premiums they donate above the fee may yield far more funding than a higher fee.

At the time of this writing, about 26 percent of those in our [Program Directory](#) charge no fee, 40 percent charge up to $50, and 19 percent charge more than that. The highest fees we know of ranged up to $125. About half the programs had some form of a sliding scale; in some cases, the fees were lower for organizational members, whereas others were income-based adjustments.

Site visit reports and recommendations

Site reports describe the conditions as the field technician first encounters them. (Later evaluations of how the site has changed may be required for certification.) The site report records what the field technician sees and translates technical concepts into language suitable to the site steward. What information the report should contain depends on what is directly relevant to your program's goals and the site steward's interests, but examples may include:

- *Context* (e.g., urban, suburban, nearby traffic, street lighting, neighborhood flooding, description of neighboring sites, and closest natural areas)

- *Physical attributes* (e.g., slope, sun exposure, soil, impermeable surfaces)

- *Ecological baseline* (e.g., presence and location of invasive and notable native species, unique attributes of the site such as large trees, use of biocides and fertilizers)

Maps, satellite images, and landscape photos are often helpful to the steward, but written descriptions may be more useful to the program than to the steward. Documentation can describe the details contained in images, and enhance the evaluation of future site conditions.

Site recommendations are suggestions to the steward that can range from the easiest to start to the most visionary. The depth and detail depend on the capacity and commitment of the stewards, the suitability of the individual site, and whether your program certifies sites. There are at least two common models for initial recommendations, depending on whether the program certifies sites:

- *Certification standards*. Some programs have standardized recommendations, such as the removal of invasives or converting a percentage or area of the site to native plants. Often these programs offer certification in tiers, with the final tier including more advanced practices. Yard signs may reflect these tiers, such as "bronze, silver, and gold" levels. The program may require periodic (e.g., five-year) reinspection to maintain certification. The advantage of this system is that it is easier to set standard levels of practice rather than to coach the steward in incremental advancement over the years. It also reinforces the program's reputation because all yard signs of the same tiers will reflect the same standards. (See more on certification under that chapter, below.)

- ***Easy to start***. Other programs engage stewards by recommending one simple task, such as installing one small space with a few native plants. The theory is that having taken that step and been acknowledged for it, the steward will be encouraged to take the next one in her long-term journey of renaturalizing her site. This approach may be optimal where many stewards have limited means or where there is a great disparity between them. For example, one site steward might hire a landscaper to do all the work, while another—equally dedicated but of lesser means—may struggle to follow recommendations. Regardless of the steward's means, the easy-to-start approach may be universally appealing. Sometimes programs based on this model neither require certification nor offer signage to avoid implying judgment by the program or comparison with other stewards. All stewards at any level may simply be "registered" with the program. In any case, a follow-up visit is necessary, not only to acknowledge achievement but also to suggest the next step the steward should take.

Site recommendations often function in part as a how-to manual with links to references (e.g., how to remove a lawn; how to install a water source; how to plant a meadow, etc.). They may provide additional information, such as where to buy native plants and other materials, where to install various features and a list of landscape and other contractors. The site recommendations also serve several roles for the program, including the following metrics:

- ***Steward's performance***. The report establishes the site's conditions at the time of the visit ("baseline") and thus enables the field technician to gauge how much progress the site steward has made toward the recommendations. Again, this helps determine eligibility for site certification and, if one is offered, a yard sign.

- ***Ecological results***. By comparing the site's condition after recommendations have been followed, the field technician can assess whether the intended results were achieved (see the section on Metrics and Monitoring).

- ***Program impact***. By combining data from all its enrolled sites, a program can assess whether it is meeting its mission. For example, if your program's goals are to reduce water pollution from residential runoff, then it may want to assess whether changes in water quality are due to the collective actions of their stewards.

How much detail to provide

Regardless of what functions you want a site report to fulfill, you'll need to decide how much detail to offer the steward. There are two common approaches. One is to simplify the report by keeping some of the technical information and details out of it. If that is your choice, it is important to conspicuously note that more is available if it is of interest to the steward; you don't want to appear to be withholding information. On the other end of the spectrum is the very detailed ecological description. Sometimes these site reports come with species lists, locations of invasive plants and other problem areas, landscaping suggestions, and even graphics that illustrate what a planting would look like. Some stewards find this approach inspiring; others are overwhelmed. Some programs report that, while the heft of a detailed document can be impressive to the steward, few read it closely. Photos, graphs, maps, and tables may get more scrutiny. There is, of course, a middle ground, such as a detailed report that emphasizes one simple step to get started. The next step can be introduced in a follow-up.

Some programs have developed a standardized report format, presumably for consistency, while others customize the reports to the individual site and its steward. Standardizing the report format will save time in writing it, regardless of how much detail is offered. Barbara Driscoll, who is co-chair of the New Hope Bird Alliance Bird Friendly Habitat Committee, says that many stewards value a list of native and invasive plants. For that reason, they have developed lists of native and invasive plants (often tagged on the site) that they can cut and paste into their site recommendations, thus providing a level of useful detail while minimizing the report writing.
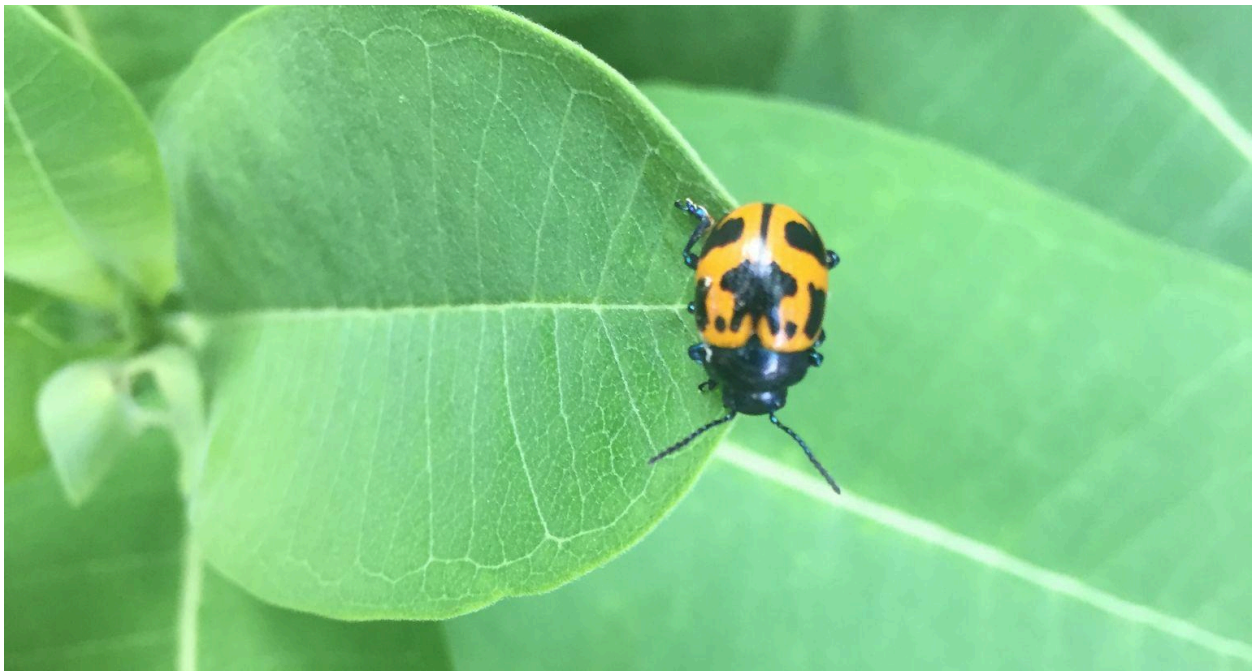
Microhabitats support a diversity of insects such as this milkweed leaf beetle, Labidomera clivicollis. Source: Village and Wilderness

What to recommend

Because microhabitat programs vary greatly in their goals, ecosystem, and social context, there are few universal site recommendations. One exception might be to always save any notable species that are already established on a site. It is surprising sometimes what rare, uncommon, or keystone plant species can persist in a yard long after development. By definition, they are adapted and native to that specific site. Preserve those first, or at least enough of them to be ecologically meaningful, before you recommend replacing vegetation.

While there are few universal rules, there are some common recommendations. Examples include:

- Remove invasive species.
- Plant a diversity of local genotype plants, especially keystone species.
- Provide plant layers (canopy, understory, ground cover).
- Limit deleterious practices, such as letting cats outdoors, and using pesticides.
- Provide tips for reducing long-term maintenance.
- Explain how to coexist with mammalian browsers (deer, rabbits, etc).
- Describe how to prepare and establish a new native garden bed.
- Suggest where to find native plants.
- Recommend further learning (book, video, podcast) and educational opportunities.
- Discuss community and citizen science projects.
- Discuss the next steps for certification.

Many of these may be compatible with any program's goals, regardless of whether their missions are for biodiversity, ecosystem services, or social benefits.

Across the majority of microhabitat programs, by far the most common recommendation is to install native plants. Besides being the foundation for pollinators and other wildlife, native plants can be included in any site from urban balconies to fallow croplands. However, for many wildlife species, native plants are only one component of a complete habitat. Two other elements—water and cover—deserve as much site-specific attention as native plants do. Different species benefit from different forms of each. The reason this is important is because one of the highest sources of mortality in the fragmented landscape occurs when animals (be they invertebrates or vertebrates) travel outside of the site to obtain essential resources for daily living, breeding, and rearing young. Juxtaposing all essential elements at or near the site reduces their exposure to traffic, predators, toxins, and other

> Across the majority of microhabitat programs, by far the most common recommendation is to install native plants.

sources of mortality. If you want a site to be an ecological source and not a sink, then you need to make sure their reproductive output exceeds their mortality.

To manage stewards' expectations, one important distinction to make is the difference between site recommendations and a landscape plan. A field technician may suggest, for example, that a pollinator garden be located in a sunny spot and what plant species to include in it. However, it may well be beyond the technician's expertise or available time to design the layout of the species so that they present well. Some programs have developed replicable garden design templates and even plant kits to go with them. Wild Ones provides some examples. Site stewards who can afford it may wish to hire a landscape planner to design the layout of the garden—or the entire site if multiple features are to be incorporated. If so, and if site certification depends on species composition, make sure the steward knows to be very specific about certification criteria when instructing the landscape planner.

Examples of reports created by some programs are available in the "Manual and Supplemental Resources" page of our Resource Center.

Water

It is axiomatic that water is essential to all life, and no other habitat feature may attract and sustain more animal species, be they vertebrates or invertebrates. Many programs have a check box for water as a certification requirement, but not all water sources are equally beneficial for every species or suitable for every site. (Here is an excellent reference from the Royal Horticultural Society.) Like native plants, water features come in a wide variety: brooklets, vernal pools, wetlands, ponds, and combinations thereof. They can be large or very small, shallow or deep, and designed for shade or sun. Depending on the size of the site and the species it can support, a water feature may be designed for birds, frogs, salamanders, snakes, turtles, bats, dragonflies, and hundreds of other invertebrates. Square foot for square foot, wetlands may support more plant and animal biodiversity than an equivalent garden area of native plants and may be the least demanding to maintain. (Note that rain barrels and rain gardens can be excellent tools to conserve water and control flooding, but the latter usually don't retain water long enough to constitute a "wetland.")

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Again, whatever the target species, a water feature can be designed to serve it. Too often, habitat programs have a water recommendation that can be checked off with a bird bath. A bird bath is not equivalent to a naturalistic water feature. Bird baths do indeed have their place, such as on balconies or in areas where birds need a clear view from potential predators, such as neighborhood cats. But they also require careful and regular cleaning to prevent the spread of disease and parasites to birds. On the other hand, for those with space for a pond, a common mistake is to design it for fish rather than for target species. Sometimes this is out of concern about mosquitoes. However, mosquitoes prefer stagnant water, which is not conducive to fish. Where fish thrive, they eat the invertebrates and amphibians that would themselves eat mosquito larvae. Generally, it is preferable to plan a feature where the water will be frequently changed or oxygenated.

While naturalistic water features can add a great deal of biodiversity and ecological value to a site, practical considerations may militate against them. One is that, ideally, they are not filled with chlorinated tap water, which until the chlorine evaporates is toxic to many microorganisms at the base of the food chain. For that reason, naturalistic ponds are often most practical in the suburban/exurban landscape where site stewards have their own wells, not exclusively town water supply. Another reason is that many stewards have inherent biases or concerns about water features. The list below addresses some of them.

- *Mosquitoes*. As mentioned, mosquitoes breed in stagnant, still water where no predators (such as fish and dragonfly larvae) can feed on their larvae, and where their microscopic food proliferates. Examples include untended birdbaths, watering cans, and any container that catches rain, according to the Centers for Disease Control. Water features that support a wide variety of species ("living" as opposed to stagnant water) generally do not support mosquitoes. That said, vernal pools, essential habitat for many amphibians and other species, may be best suited to larger sites where they can be placed away from where people congregate.

- *Water conservation*. Lawns can consume large amounts of water and so, in many areas, they are being replaced by less thirsty native plants. Especially in arid environments, water conservation is a justifiable concern, and a pond can look like its opposite. However, lawns leak, ponds don't, which is why they are ponds. Particularly in arid areas, it is surprising how small a water body can be and still attract wildlife.

- *Maintenance*. Few things dissuade one from installing a water feature more than dealing with an algae-choked pond. This is a particular concern in ponds in full sun and those with fish. Fish food and fish waste are high in excess nutrients. Such ponds may require pumps, filters, bubblers, vacuuming of sediment, draining, and refilling. Fortunately, there are many ways to mitigate much of this maintenance—for example, keeping ponds small, in shaded areas, and fish-free. If necessary, bubblers that oxygenate the water or pumps that recirculate water from a pond to a small wetland filter and back via a brook are examples of options for larger systems, but even a small water feature can attract and hold many more species. Many commercial landscaping guides and resources are available on the internet to help create a minimal-maintenance water source.

- *Hazards*. Ordinances in some communities require fencing to keep small children and pets away from potential drowning hazards. Typically this is meant to apply to swimming pools, with steep edges, but may apply to ponds as well. Natural ponds should have very shallow margins, which allow many emergent plant species to grow and also make it easy for anything that falls in to easily get out. Regardless, if fencing is required, then all fencing ordinances should be followed.

Cover

As with native plants and water sources, cover comes in different forms and provides different services for a variety of species. Whether they are feeding, migrating, breeding, rearing young, resting, or hibernating, cover can reduce exposure to predators and adverse weather. As such, the best kind of cover for a site depends on the target species and the vulnerable points in its life cycle that need protection. Microhabitat programs frequently focus on cover for reproduction, but not at other points in the animal's life cycle. For example, a snake species may use a composting sawdust pile for egg-laying, thick vegetation for hunting, and an underground hibernacula for winter. If the breeding adults cannot survive the remainder of the year, it does little good to provide them with a nest site for the breeding season.

The size of the site influences what species may be targeted. For birds in large yards, research by Belaire et al. (2014) has shown that a mix of deciduous and coniferous trees increases bird reproduction, including non-cavity nesters. Smaller yards can be specially designed for target species in suburban to urban locations. Examples include extended eaves for phoebes, artificial "chimneys" for chimney swifts, gravel rooftops for terns, and platforms for peregrine falcons. All these are migratory species, so providing cover for the rest of the year is not necessary. Cover can be designed for year-round residents, such as pollinators, even for small and isolated sites.

> *Possibly the least recommended, least common, but most generally useful form of cover in the fragmented landscape is dense vegetation.*

Possibly the least recommended, least common, but most generally useful form of cover in the fragmented landscape is dense vegetation. Examples include grass and herbaceous plants (for meadow voles, shrews, snakes, and many species of ground-dwelling invertebrates) and native shrubs and vines (birds). One reason for this lack of popularity may be that the concept of dense vegetation may not mix well with the traditional neighborhood aesthetic. However, "dense" doesn't necessarily mean unkempt-looking. A wide hedge of mixed species often suffices.

Another issue is management. Shrubs need to be sized to the location; if they are not, they may need pruning and a place to put the trimmings. Thick shrubbery makes it hard to see invasive species, such as buckthorn or bittersweet, getting a foothold before they can be easily weeded out.

Finally, perhaps the most common limitation is space. Where space does not allow dense vegetation, other techniques can provide shelter, such as cover boards (snakes, amphibians, ants, and other invertebrates) and brush piles (small mammals, lots of invertebrates). Incidentally, it is helpful if one plans the location of a brush pile before planting shrubs: the latter can shield the former from view and also provide a convenient place to dispose of pruned trimmings.

When considering the daily rounds of a target species, it can be beneficial to plan cover to connect the most common activity areas, such as between feeding and watering places.

Food
Providing food, particularly in the form of bird feeders, may be the most intuitive and commonly followed practice in site recommendations. It's easy to understand why. From the steward's perspective, feeders often provide quick results, and the birds provide a lot of active entertainment. Even apartment dwellers can hang them from window sills and balconies. From the program's perspective, the practice is commonly understood by the novice, easy to implement, and the seed and the feeders are readily available. One program leader described bird feeders as the "gateway drug" that invited stewards into the larger microhabitat movement.

That said, feeders are not without their detractors. For one reason, seed and suet feeders feed non-native pest species (for example in the United States, rats, starlings, and house sparrows) as well as native ones, and may help give non-native birds a competitive advantage over nesting sites in the microhabitat. For another, these same feeders can also make some unintended native species, such as skunks and raccoons, unnaturally abundant. Others, such as black bears, can be dangerous. Further, feeders predictably concentrate birds, making them a good hunting spot for cats and some hawk species. The former can attack from nearby cover, and the latter can drive panicked birds into windows, where they dash for cover. Other kinds of feeders dispense nectar and fruit and tend not to concentrate as many birds, but all feeders, like bird baths, need regular cleaning so they don't spread disease. In short, some programs extend the dictum "don't feed the wildlife" to mean birds as well as bears. Other programs appear to tacitly accept the downside of bird feeders as the cost of pulling people into the fold, perhaps with the hope that a steward's awareness will grow and their practices improve for the net benefit of wildlife in the long run.
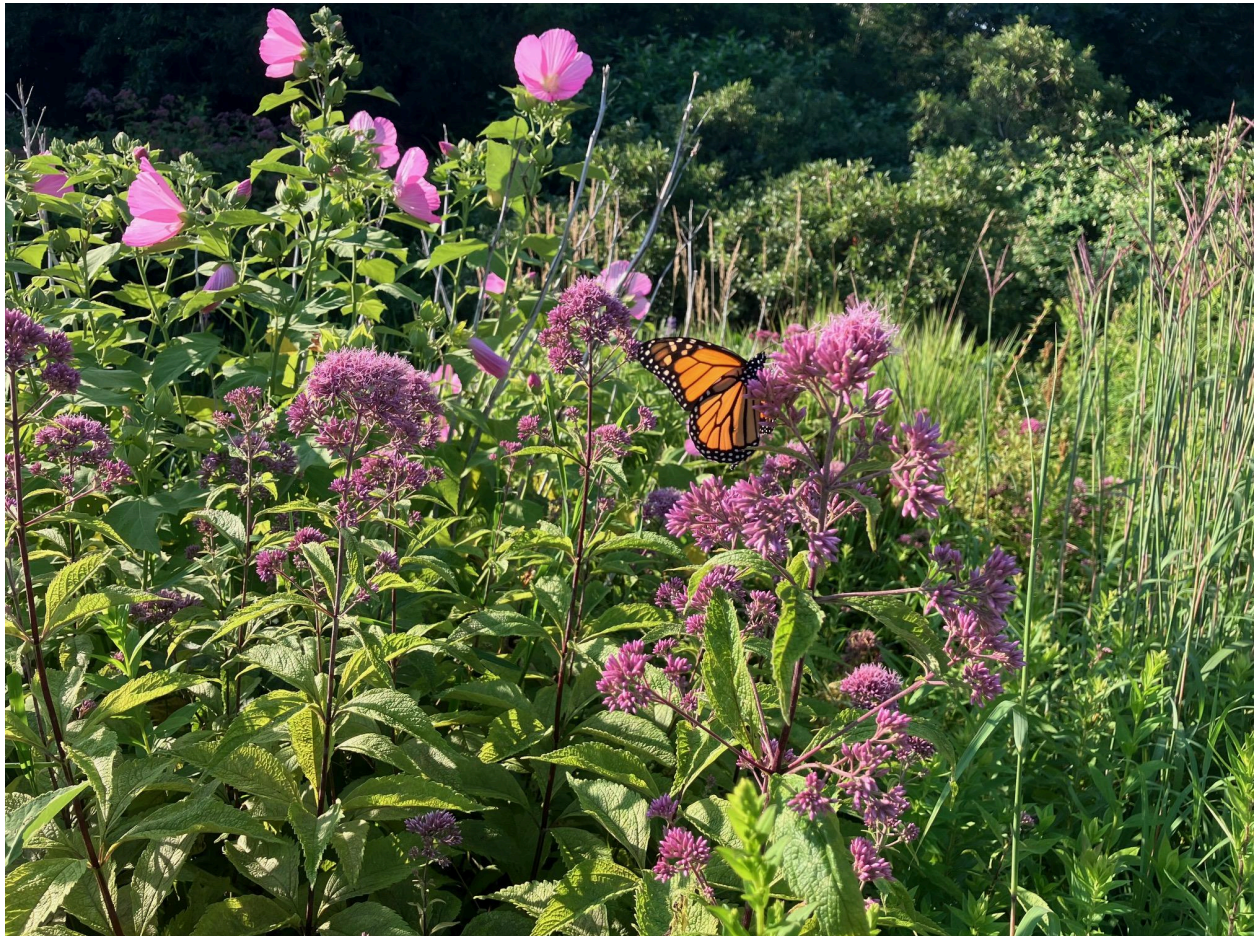
This stand of flowers provides a rich source of nectar for Monarch butterflies and other pollinators. Source: Village and Wilderness

There is, however, one uncontroversial food source for birds as well as other wildlife: native plants. Tallamy (2007) powerfully makes the case for native plants not only for their fruits and seeds but particularly for their capacity to supply insects—the essential source of protein for nestlings. As discussed in the introduction, for a microhabitat to become a population source and not a sink, it must produce more of a species than it attracts. Narango (2017) showed that the more native plants that were in a yard, the more native chickadees it produced. The birds had more protein to create larger clutches and feed their nestlings because there were more insects to be found on the native plants.

Plant seeds and berries also provide food for birds during migration and the non-breeding season. But perhaps the biggest impact native plants have is in providing food for a much larger and more diverse assemblage of invertebrates, including a diversity of pollinator species as well as mammals and other vertebrates. Unlike seed and suet feeders, plants offer food for many species and in many forms, including pollen, nectar, leaves, fruit, seed, sap, roots, and other plant parts. Further, they can provide cover, increase the microbial diversity of soil, filter and capture runoff, and sequester carbon—and they do so year-round.

Specific versus generic recommendations
Specific goals need specific recommendations, but the converse is not true. General goals, such as "increase biodiversity," are not served by generic recommendations. Take, for example, a program that advocates native plants because they are usually beneficial to biodiversity, pollinators, and ecosystem services. If the program always recommends the same

> The smaller the site, the more specific recommendations need to be for meaningful impact.

short list of hardy native plants, then it may have increased the diversity of plants on a site but added very little diversity across the landscape. That's because the native landscaped sites all begin to resemble one another. (This is the difference between alpha and gamma diversity.) Moreover, plant recommendations not tailored to the site's conditions, are less likely to serve the pollinators in the neighborhood or support the animal species that depend on them and the ecosystem benefits they yield.

Of course, the larger the site, the more it may accommodate multiple targets. Put another way, the smaller the site, the more specific recommendations need to be for meaningful impact.

Maintenance and upkeep

Site plans often recommend practices and how to get them started. But too often missing is a realistic statement of the long-term implications: the time, cost, and effort required to maintain them. It can be hard enough to build a community aesthetic that embraces a yard that looks wild and natural, but few things can disappoint a site steward or alienate neighbors like a site that is too overwhelming to manage. Rain gardens where the over-nourished Joe Pye weed flops over, hedges so impenetrable that the oriental bittersweet takes over before the problem is discovered, ponds filled with algae—all these can be real downers. There are at least four ways to prevent this bleak result:

1 Restrict first recommendations to small areas. Let the site steward experience how much effort it takes to manage one native plant bed before planning to convert the entire site.

2 Be explicit about when and how to do the maintenance and estimate the time it will take. If watering of new plants is needed, then specify when, how much, and for how long (e.g., after planting, through dry spells, and for the first two or three years). If an invasive plant needs to be removed, be sure to mention that it may take several years of plastic sheeting, mulch, weeding, and/or herbicide application.

3 Review the maintenance needs with the site steward before putting the recommendation in writing or requiring it for certification. If necessary, recommend where to get help, be it from a landscape contractor or a volunteer team.

4 Acknowledge effort! It can take a long time for native plants to dominate the site and outcompete invasives. Until beauty and the feeling of accomplishment can become reward enough, maintenance can just feel like drudgery. Encourage the site steward to take before-and-after photos and share them with the field technician or on your program's social network. In the meantime, encouragement from the field technician or peers can help keep the steward motivated and on track.

Well designed microhabitats can support amphibians like Eastern newt, Notophthalmus viridescens. Source: Village and Wilderness

Certification

Programs differ in their perspectives on certification. For some, certification imposes a barrier to participation, especially for those less able to meet its standards or for whom evaluation is a form of judgment. For others, certification provides a much-wanted structure, with a clear goal in sight and specific benchmarks to meet. It also establishes comparability so that yard signs connote a more or less uniform level of ecological contribution. Certification also protects the reputation of the program by eliminating stewards seeking the virtue-signaling of the yard sign but uncommitted to following the recommendations. However, even for those programs that do certify sites, there is great variation. Some offer a single certification while others offer tiers for levels of achievement. There is even greater variation in what the standards require. Fogel et al. (2023) summarized certification criteria for 115 programs in their study (Table 5).

Table 5. Certification criteria and frequency of use across programs (adapted from Fogel et al. 2023)

CRITERION	%	DEFINITION
ALAN	6	Limit artificial light at night (ALAN) by, for example, regulating outdoor lighting with a motion sensor
Bare soil	19	Keep bare soil for ground-nesting insects such as bees
Bee hotel	23	Install a bee hotel
Bee plants	16	Plant species that provide nectar and pollen to bees
Birdbath	48	Install bird bath or other water feature
Bird feeder	23	Maintain a bird feeder
Bird plants	10	Plant species that provide resources to birds
Bird/bat house	47	Install a bird or bat house
Butterfly host plants	45	Plant species that butterflies lay eggs on
Butterfly nectar plants	30	Plant species that butterflies get nectar from
Cats indoors	17	Keep pet cats indoors so they do not kill birds and other wildlife
Composting	27	To reduce waste in landfills, compost instead of throwing yard waste in the trash
Dead plants	13	Usually keep dead plants in place through the winter
Invasive plants	53	Remove invasive plants
Lawn area	25	Reduce the area of lawn
Lawn Clippings	11	Leave lawn clippings in place to promote soil health
Lawn height	10	Let lawn grow higher so that flowers can grow or improve soil health
Lawnmower	4	Use an electric or manual mower instead of a gas-powered one to limit air and noise pollution
Leave the leaves	19	Keep fallen leaves over winter for animals to nest in
Log/brush pile	40	Keep logs or brush for animals to nest in

Mulch	23	Decide what types of mulch to use (e.g., no peat mulch) and how thick to mulch
Native plants	65	Install plants from the region (generally, not specifically for one taxa)
Pesticides	66	Do not use pesticides, or limit their use in a targeted manner
Soil health	10	Maintain soil health, e.g. by adding amendments
Window treatment	13	Put decals on windows to prevent bird strikes
WATER CRITERIA		
Bioswale	10	Install a bioswale to control water during storm events
Fertilizers	23	Limit to reduce eutrophication in waterways
Irrigation	25	Minimize water use
Lawn watering	11	Adjust the time of day to water the lawn
Pervious pavement	10	Install permeable hardscaping
Rain barrel	28	Install a barrel to catch water off the roof
Rain garden	28	Install a rain garden to control water during storm events

SOCIAL CRITERIA		
Aesthetics	5	Maintain aesthetics such as a tidy front yard or strip of grass next to the sidewalk
Community outreach	11	Participate in community outreach such as a citizen science project or garden tour; recruit others; volunteer for sponsoring organization
Mosquitoes	2	Make sure the yard does not have a mosquito-breeding habitat such as standing water; put limits on mosquito spraying, which mostly kills non-target organisms

Native plants are the foundation for most microhabitat programs' standards, but Fogel (2024, report to Village and Wilderness) identified five different models among 36 of 116 microhabitat programs:

- *Percent area*. For eight programs with multiple tiers of certification, all but one used a percentage of native plant cover. The lowest tier varied from 5 percent to 33 percent cover class and the highest tier varied from 40 percent (from a two-tier program) and 50 percent (from a three-tier program) to 100 percent. (Fogel (personal communication) notes that because 100 percent cover is usually an unattainable goal, 50 - 75 percent may be a more accurate characterization.)

- *Absolute Area*. Three programs required a minimum area of native plants with two requiring 100 ft^2 and one 50 ft^2.

- *Vertical complexity*. Eight programs required a minimum number of canopy layers, e.g., wildflowers or grasses, shrubs, understory trees, and canopy trees. Six others required several species of different types of plants such as trees, shrubs, flowers, vines, and ferns.

- *Seasonal variation*. Seven programs required some plant species to be in flower across the growing season. For some of the programs that require categories of plants to achieve vertical complexity, the phenological component was built in. For example, North Carolina's Native Plant Garden Certification Program required three species from five out of 11 of the categories of plants: canopy trees, understory trees, shrubs, spring-blooming flowers, summer-blooming flowers, fall-blooming flowers, ferns, grasses, vines, mosses, and water plants.

- *Host and food*. Four programs required butterfly host plants and one also required berry producers.

While berry-producing native plants are the most commonly recommended criteria for certification, there is frustratingly little agreement on what constitutes "native." Fogel (2024) reports that:

"Among the 28 programs, 17 (60%) did not provide a definition of native plants. Among the 11 programs that had a definition, 9 were succinct and easy to understand while the remaining two were 73 and 98 words long. The definitions were based on two main themes——ten of the definitions mentioned evolution with native animals or adaptation to local resources, and five mentioned that the plants were found in the area pre-European arrival. Four definitions mentioned both adaptation/co-evolution and European colonization.

Twenty of the programs operated at a sub-state level. Among those programs, ten recommend plants native to the sub-state level, four recommend plants native at the state or multi-state level, and the remaining six did not have a region listed."

When programs do not have ready access to local genotype plants it can be very difficult to advocate for them without resorting to what is "native" to the State or larger region. Rather than be vague about the definition, a policy might be worded such as "until local genotype plants are available, we recommend the next best thing, species that are native to the area and available within the [State or region]."

Most programs do not equate "nativars" with native plants as the process of cultivation can reduce the value of the plants as a host to pollinators and other animals.

Bumblebee on water willow, Decodon verticillatus. Source: Village and Wilderness.

Until a standard definition of what constitutes a native plant is adopted by the microhabitat movement, you may choose to craft your own definition that meets your program's goals. Fogel (2024) made the following recommendations in her report to Village and Wilderness:

- Keep the definition short.

- Mention the plants have been in the area a long time, whether by using language like "thousands of years" or "pre-European arrival" (the WHAT).

- Localize the definition by mentioning where the program is based, whether that be a small region, state, or larger region (the WHERE).

- Mention one or two reasons why it matters that the plants have been here. Other reasons can be written later. I think the most powerful and easiest to understand reasons are that they are adapted to local conditions and provide the best resources for animals (the WHY).

Whether or not to implement certification standards may depend on the variation in the population that your program serves. That is, if the majority of your community has little time and few personal resources, then you may want to focus on simple steps to get them started. Conversely, where the majority of stewards are more affluent or able, you may want them to adhere to more rigorous standards. The difficulty comes in when there is a great range in site stewards' abilities, for standards may not be realistic or equitable. Also, programs that customize their recommendations to the individual site may not be able to require uniform criteria. The goals for each site will differ, and so too the recommended practices to achieve them.

Programs that certify compliance with recommendations are often coupled with signage, sometimes in tiers (e.g., bronze, silver, and gold achievement levels). Details on signage may be found below under Part III—Nuts and Bolts.

Follow-ups and verification

There are two reasons that field technicians should follow up with stewards after recommendations have been made. One is to encourage the site stewards and help them solve problems. The other, for programs that offer certification and signage, is to verify that recommendations have been followed. Both take time.

Encouragement

Regardless of how simple or ambitious your recommendations are, the critical question is what will most likely result in the site steward taking action? Many microhabitat programs acknowledge that action depends on their relationship with the site steward. Stewards' agreements to follow recommendations will be enhanced if they agree to a date to follow up by phone, email, or in person. Probably most programs would say that in-person follow-up visits on the site are best, but that they are very time-consuming. For that reason, some programs intersperse in-person visits with phone calls and emails or virtual meetings. Virtual meetings can be enhanced if the site stewards are asked to photodocument and share their progress. People respond best to encouragement and guidance coupled with gentle expectations. In short, the recommendations are only the first step in the stewards' journey with their site and their relationship with your program.

> People respond best to encouragement and guidance coupled with gentle expectations. In short, the recommendations are only the first step in the stewards' journey with their site and their relationship with your program.

Another way to help site stewards problem-solve while minimizing field technician time is through a social media platform, such as Facebook, open to all stewards in the program. These online communities can be a vibrant source of practical how-to information. Sometimes a novice is more comfortable seeking advice about basic matters from a peer rather than from the field technician (the "busy expert"). Also, somewhat more knowledgeable practitioners often enjoy sharing their own experiences and information, which helps to build a sense of community.

Verification

Photodocumentation is one of the easiest ways to verify that recommendations have been followed, such as removing a patch of invasive species or installing native plants, a water feature, or cover. Photodocumentation, of course, implies that a "before" picture has been taken either during the field technician's site visit or by the site steward. Digital images may be included in the site report or kept in a digital file for each site. There are several standardized methodologies for photodocumenting ecological change and habitat restoration, the principles of which can be adapted for microhabitat management. Here is one from the USDA Natural Resource Conservation Service.

Behavioral recommendations are usually verified on the honor system. Examples include ceasing the use of chemical fertilizers or pesticides, minimizing outdoor lights, and planting only local ecotype plants. A closer on-site inspection may be necessary if, for example, the field technician needs to verify that particular species have been planted or if cats are being kept indoors.

Recertification

A nearly inevitable problem with most certified sites is what to do when the site falls out of compliance, which can happen for several very understandable reasons. Perhaps the steward (or the family member who did the work) has aged or is otherwise unable to keep up the maintenance. Or maybe the landscaper retired and new ones who understood microhabitat management cannot be found. Also, eventually, all sites change hands and the new stewards may not value the renaturalized landscape. Innocent as those reasons are, there can be several repercussions. One is that the stewards' investment of effort can be lost, along with the ecological value of the site. Another is that a yard sign can stay up while the habitat deteriorates, which can reflect poorly on the program (and the movement as well).

When a program has relatively few stewards, compliance and recertification can be done on an ad hoc basis. Again, this may be a feature of an ongoing relationship between the program and the site stewards. Programs with many stewards, however, may need to develop a recertification schedule, say, for example, every five years. Some programs ask that the stewards notify the program before the site is sold, so that the new stewards can be engaged and, if interested, enrolled. Many stewards are willing to do this, in hopes that all their hard work won't be undone. Many advertise naturalistic landscaping as a site amenity, hoping to attract a like-minded buyer. (We even heard of a case where the steward made maintenance of certification a requirement of sale.)

> Inevitably, some sites will fall out of compliance over time, but the loss may be outweighed if your program's enrollment rate is greater than its attrition rate.

Inevitably, some sites will fall out of compliance over time, but the loss may be outweighed if your program's enrollment rate is greater than its attrition rate.

Unlike traditional land conservation, which permanently protects sites through stewardship or conservation easements, much of a microhabitat program's value is in creating a mosaic of sites across the fragmented landscape. Permanent protection of individual sites is indeed desirable, but it is neither realistic nor as necessary as it is in wild lands. After all, the natural habitat on most developed lands has already been destroyed, so the goal is more about remediating more land than protecting individual microhabitats.

Metrics and monitoring

Certification verifies that site recommendations have been followed, but metrics verify the results. Monitoring is the process by which metrics are gauged, such as tallying the number and diversity of pollinators. Besides helping you meet your goals, metrics are important to persuade funders, policymakers, partners, and the community that your program is having a meaningful impact.

For reasons beyond the site steward's control, species, and natural systems sometimes don't respond as expected. For example, a municipal mosquito control program may negate efforts to boost pollinator numbers, new neighborhood cats may render yards bird-unfriendly, and an explosion in the deer population may make it impossible to sustain some native plants. Metrics are important to understand where and how recommendations need to be adjusted, whether at the site, neighborhood, or landscape scale.

Given the importance of metrics, it may seem surprising that few microhabitat programs develop or monitor them. There appear to be several reasons for this. Some organizations feel that monitoring is research, and research is beyond their remit; that is the role of academics, institutions, and agencies such as watershed councils. Alternatively, organizations may feel that enough research has been done or is ongoing, which validates their goals and recommended practices. Another reason is that monitoring can be time-consuming and expensive.

That said, many organizations do feel that better data is needed to support their programs and the movement as a whole. They would likely be willing to engage in metrics if they could employ simple, standardized protocols. This would also enable them to pool their data from other programs to see which practices yield the best results for different ecosystems and landscape types, such as urban, suburban, and agricultural areas.

It is hard to develop standard monitoring protocols if the goals for each site are different. Programs that view individual sites as contributing to a unified purpose can evaluate the larger-scale impact through established methods, some of which may already be conducted by partners. For example, urban planners and departments of transportation may already be keeping track of street flooding or air pollution. Soil and Water Conservation services may be tracking water quality in nearby lakes and streams, or measuring pollination services. New monitoring methods can be conducted through local groups. For example, neighborhood associations and cultural groups can survey their members to gauge whether they are becoming more engaged with microhabitats, nature, and conservation.

Many programs encourage site stewards to use apps such as iNaturalist or Merlin to identify insects and birds in their yards and share their observations on social platforms. A few conduct "bioblitzes" on representative sites with expert naturalists. The information that emerges from these efforts can be inspiring, but generally, the sample size is too small to see if there are impacts at the landscape scale. To gauge landscape-scale results, Fogel et al. (2023) advocate that research and academic institutions work with multiple microhabitat programs to develop simple, standardized metrics.

One innovative approach developed by the Wildlife Sanctuary Program of the Northern Virginia Bird Alliance deserves attention. Rather than simply certifying that the site steward has fulfilled yard recommendations, the Wildlife Sanctuary Program also provides indicators of the yard's performance in terms of "sanctuary species." These species were selected to measure

"...success in creating habitat for native animal species. All are native to Northern Virginia as year-round or seasonal residents, or as migrants in transit between winter and summer ranges. They are suffering or are at risk of population declines due to habitat loss from urbanization. They are able to tolerate some amount of development, if suitable habitat is available, so most Wildlife Sanctuary Program participants can expect to attract at least 10 Sanctuary Species in all but the more intensely urbanized parts of our region. None of the Sanctuary Species are so fully adapted to development and human activity, such as Eastern Gray Squirrels or American Robins, as to not need our help."

This system offers five attractive features:

1 To show that a site is ecologically successful, only 10 of 42 species from six categories of organisms need to be recorded. It doesn't matter which 10 they are, so long as not more than one comes from a similar species group (e.g., woodpeckers).

2 The system uses species that many stewards can easily identify.

3 This approach distinguishes between the merit-worthy efforts of the steward (who may qualify for a yard sign if she has completed recommended tasks) and the ecological results. In other words, even if the site doesn't log enough sanctuary species, the site steward still gets credit for doing the work. If the sanctuary species don't show up, it's likely for reasons beyond the steward's control (such as nearby disturbance). This is valuable information, for it may help the program develop a strategy to address previously unidentified problems.

4 This approach also allows a site steward to get credit for having left much of her native habitat intact in the first place. This is often a conundrum in exurban neighborhoods where the land steward wants to improve her habitat but already has a substantial amount of it in a natural condition. Why should she not get recognition for the species it produces, even if there is little more she can do?

5 Data from multiple sites may be aggregated to estimate population changes at the neighborhood and landscape scales. The presence of sanctuary species does not necessarily distinguish between a breeding site and an ecological trap. However, the larger-scale efficacy of site practices may be inferred if the sanctuary species are increasing across multiple sites.

A common problem with microhabitat programs is that some ecological results may take a long time. In those circumstances, you may wish to employ sequential metrics. For example, if the program's goal is to cool streets with shade trees, you don't want to wait 20 years to see if the strategy worked. Your first goal may be to install a thousand saplings, and your initial metric may be simply to see if they all got planted in the pilot program. A mid-term goal may be the survival of at least half of the saplings until they can survive on rain alone; the metric may be verifying that volunteers are doing the watering in the meantime. A long-term goal may be cooler streets, and the metric may be whether shaded streets are significantly cooler compared to unshaded streets nearby.

Community science engagement

The purpose of metrics is usually internal to your program, to gauge the impact of its recommendations. But there is also an external, outward-looking role that some of your stewards may play as well. Involving them in community science (or "citizen science") projects can get more people deeply engaged and invested in the natural world around them while contributing to local and global scientific data for monitoring and researching natural phenomena. Tools like iNaturalist, the app on which anyone can (and millions do) record their observations of nature, may help research scientists who can then mine unprecedented quantities of data to conduct deeper inquiries. Here is a link to the iNaturalist starter guide.

Microhabitat programs can participate in existing efforts (such as NestWatch at the Cornell Lab of Ornithology) or create community science projects based on criteria relevant to their mission. For example, the Monarch Joint Venture (MJV) and its habitat program the Monarchs and More Western Habitat Program run the mission-specific Integrated Monarch Monitoring Program with their science team, and MJV also partners with the University of Wisconsin-Madison Arboretum on the Monarch Larva Monitoring Project. The iNaturalist app, while global, also gives programs the ability to create their own community science projects. (See guidance here.)

Community science can also be an effective way in which to engage youth and foster a new generation of stewards and advocates. Depending upon the specific effort, it may be necessary to build training into educational programming, so that lay stewards use the tools as accurately as possible and, also, follow protocols to avoid inflicting (or incurring) harm while gathering data.

Unlike the restoration and management of wild lands, where there have been decades of research, comparatively little is known about how to make the best of microhabitats. This is one of the few fields where the amateurs can be the experts, and their observations can guide the science.

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Evaluating the program

At the beginning of this manual I discussed making the case—"the pitch"—for creating a microhabitat program, be it under the auspices of an established organization or a new one. In either case, you will have had to convince stakeholders not only that your program is successful but that it advances their goals. Ultimately, you will need to show results, but long before then, you may need to prove that your program has promise. Presenting convincing evidence may be critical to grow your program from a pilot phase to a permanent one.

In newly created organizations, evaluating success will often be intuitive and immediately obvious in the answers to questions such as:

- Do the practices seem likely to resolve stakeholders' issues?
- Do the practices appeal to site stewards?
- How much did the program cost, and what's the future budget?
- How much staff and volunteer time did it take?
- What were the labor/person hours?
- Was the training of staff and volunteers adequate?
- Was there good supervision and organization?
- Do we have access to the necessary information?
- Are the website and social media platforms useful?
- What are the prospects for more funding?
- Can we grow the pool of staff or volunteers to meet the demand?
- Is there sufficient access to native plants and other materials?
- What was the rate of steward recruitment, and what do we expect in the future?

For established organizations, the questions will likely reflect the concerns that emerged when making the pitch (Table 6).

Table 6. Common concerns of established organizations

Concern of established organizations	Evaluation
Will a microhabitat program detract from our core mission, such as protecting the last remaining open space in our community?	Has there been a decline in other priorities due to funding or staff time redirected to the microhabitat program?
Will it dilute our branding and reputation?	Has the microhabitat program been recognized in local media? Has it overshadowed pre-existing priorities? Has the program raised any concerns in the community? Has the organization gained more members through the program? Has it achieved greater diversity or representation of local communities?
Will it impact funding from our limited number of donors?	How much did the program cost? How much funding has it generated? Has the program resulted in new donors? Have long-time donors redirected their support from other programs to the microhabitat, or expanded their gifts?
Do we have the staff with the right expertise?	What problems have emerged in the program and have staff or volunteers been able to address them? Are their experts or resources available to advance their training?
What constitutes success and a determination of whether to continue the program or not?	How many site stewards were approached, how many of those enrolled, and how many enrollees were certified?

Advancing the movement

One purpose of this Manual is to reduce the amount of "reinventing the wheel" by sharing practices that have worked elsewhere. On the other hand, every community presents different challenges and opportunities for inventing new solutions to common problems. In a sense, each is a laboratory for inventing new solutions. By comparing your community to others you may see an opportunity where, in solving a problem through your program, you may have created a solution that others can use. In this way, you may design your program to advance the entire field. Here are a few examples of where the microhabitat movement can use innovation:

- Reaching underserved communities and demographics

- Partnering with the landscape contractor and architect industry

- Developing ordinances, laws, and policies that support microhabitats and native plant landscaping

- Influencing commercial nurseries to grow local genotype plants

- Recruiting the next generation of field technicians and microhabitat leaders

- Developing metrics and replicable monitoring methods

- Partnering with Master Gardeners, Master Naturalists, native plant societies, and garden clubs

- Developing funding streams from governmental sources, such as Soil and Water Conservation Services

- Using community science to develop local and regional species targets, and to customize goals and practices to benefit them

Part III:

Nuts and Bolts

In this section are some recommendations drawn from multiple programs, whether gleaned from their websites or interviews. Examples of different features created by some programs are available in the "Manual and Supplemental Resources" page of our Resource Center.

Choosing a name

Every program needs a name, but selecting one that evokes your mission and that is also unique enough to distinguish it from other programs can be tricky. If the program is part of an established organization, it also may need to be consistent with, but different from, that organization's name. Here are some pointers:

- *Reflect the mission*. First, be clear about what the problem is that your program is solving. Generic phrases lose potency if your program is specifically targeting a species, restoring an ecosystem service, or building a conservation ethic.

- ***Imagine that the program will exceed your expectations***. Try to select a name that encompasses that vision and does not limit it: for example, including the word "backyard" when you envision eventually incorporating front yards and community spaces or aim to include people who do not have backyards; or not focusing on a single pollinator species in case the conservation status of that species changes and becomes less of a rallying cry. Avoid trendy names that may become outdated.

- ***Uniqueness.*** Consider what sets your program apart from others. Highlight distinctive aspects of your work or geographic focus.

- ***Envision where the name will appear.*** For example, on yard signs, letterhead, the organization's newsletter, print, and social media. Consider how the name will fit into your overall branding strategy, including logos, taglines, and marketing materials.

- ***Identify your target audience.*** This would be the groups or individuals you aim to engage with, such as donors, volunteers, policymakers, or the general public. Consider their preferences and what kind of names might appeal to them. What do you want them to think when they see the name?

- ***Involve key stakeholders.*** At an early stage, include the organization's leadership, prospective stewards and influencers, field technicians, and partner organizations. These are the people who will use and "own" the name. Brainstorm relevant keywords that evoke positive emotions and a sense of purpose. You may also want to include insights from professional marketers and advertisers.

- ***Be clear and concise.*** Choose a name that is easy to remember, spell, and pronounce. Avoid overly complex or technical terms that could confuse people.

- ***Check for availability.*** Ensure the name is not already in use by another organization by verifying the name is available for registration. Check domain name availability if you have a website. If necessary, consult with a legal expert to avoid potential trademark infringements.

Creating a nonprofit

If you are not building a program from within an established organization, or if your program is not composed entirely of volunteers, you may need to create a nonprofit organization of your own. This is not particularly difficult, but it does take time and very specific legal expertise, which is beyond the scope of this Manual. To give you a sense of what is involved, you will be required to explain your mission, develop bylaws, establish a board of directors, register with the State, obtain an employee identification number, and, if you want tax-exempt status, apply to the Internal Revenue Service. We created Village and Wilderness with pro bono legal and financial help and, if we were to do it again, would gladly pay for the expertise and the focused attention that comes with it. Below is a sample of directories, many of which offer pro bono services.

- American Bar Association (ABA)
  - Website**:** ABA Free Legal Answers
  - Services: Offers a platform where eligible users can post legal questions and receive answers from pro bono attorneys
- Lawyers Alliance for New York
  - Website**:** Lawyers Alliance
  - Services: Provides legal services to nonprofit organizations in New York City
- Nonprofit Legal Assistance Program (NLAP)—Massachusetts
  - Website: MLAC
  - Services: Offers pro bono legal services to nonprofits in Massachusetts
- Pro Bono Partnership
  - Website: Pro Bono Partnership
  - Services: Offers free legal assistance to nonprofits in New York, New Jersey, and Connecticut

Paper wasp, Polistes spp, on goldenrod, Solidago spp. Village & Wilderness

Brand and logo design

Your brand is what your organization or program is known for, and your logo is meant to graphically represent that brand (or at least be recognizable and remind people of what your program is and does). As with everything else, this all stems from your program's purpose and what strategies you generally advocate to achieve it. For a sample of brands and logos, refer to our Program Directory. There are many creative professionals and online resources available to help develop your logo, but here are some basic steps to get started.

1. Start by clearly defining your identity: recite your purpose, priorities, goals, and strategy. It is easy to get carried away with an attractive design that doesn't truly reflect your purpose.
2. Identify your target audience (for example, do-it-yourselfers, low-income, affluent, landscapers, etc.) and how your program is different from others available to them.
3. Look at successful brands and logos for inspiration and to make sure your logo will be sufficiently different. You might also seek inspiration from other fields to ensure uniqueness.
4. Brainstorm ideas and test concepts and sketches with your core team and, ideally, with representatives of your target audience, partners, and potential funders.

5. Once you have a selection of promising sketches, move to digital design software such as Adobe Illustrator or Canva to create polished digital versions of your logo concepts. Experiment with different layouts, fonts, and colors to find the best combination.
6. Keep your logo design simple and versatile to ensure it works across different mediums and scales. A strong logo should be easily recognizable, even when scaled down or displayed in black and white.
7. Choose typography that complements your brand identity and reinforces your message. Consider factors such as readability, personality, and appropriateness for your target audience.
8. Select a color palette that reflects your brand's personality and resonates with your target audience. Colors evoke emotions and associations, so choose colors that align with your brand values and messaging.
9. When incorporating icons or symbols into your logo, ensure they are meaningful and relevant to your brand identity. Icons can convey specific messages or associations that enhance the overall impact of your logo.
10. Gather feedback on your logo designs from stakeholders, peers, and your target audience. Then make adjustments and refinements to achieve the desired outcome.
11. Ensure that your logo design is original and does not infringe on any existing trademarks or copyrights. If necessary, consider consulting with a legal professional to protect your brand identity through trademark registration.
12. Once you've settled on a final logo design, ensure that it is implemented consistently across all brand touchpoints, including your website, marketing materials, packaging, and signage.
13. If possible, reference the parent organization in the logo. To drive overall brand and support (say for a land trust), the logo should ideally feel related to the broader brand.

Website

In these times it is nearly impossible to start a program without a website. At its most basic level, a website is proof that your program exists. It can also be a source of much information about your program's purpose, priorities, and recommended strategies; who your target audience is; what practices you want them to follow; and access to resources such as native plants. Websites can be a place where stewards register, schedule a site visit, and report on their site's progress. How viewers read your website depends a lot on the utility and freshness of content, plus effective marketing. Some entrepreneurs are tech-savvy enough to develop their own websites, while others recruit pro bono or professional help. However, if your program is under the aegis of another organization and simply needs a web page, then likely you will need to engage the organization's web designer for consistency in style. Below are links to some resources that may provide guidance.

- Elegant Themes
  - A guide specifically for using WordPress to create a nonprofit website, including choosing themes, plugins, and customization tips.
- Google for Nonprofits
  - Offers tools and resources for nonprofits, including the use of Google
  - Sites to create and manage a simple, effective website.
- Nonprofit Hub
  - Comprehensive guide covering planning, design, content, SEO, and ongoing maintenance of a nonprofit website.
- Nonprofit Tech for Good
  - Offers practical advice on website design, navigation, mobile optimization, and content management to enhance user experience and engagement.
- Squarespace
  - Offers resources and templates specifically designed for nonprofits, with guides on setting up and customizing your site.
- TechSoup
  - Provides a step-by-step guide on planning, designing, and maintaining a nonprofit website. It covers essential elements like content strategy, design tips, and choosing the right platform.
- Wix
  - Provides templates and tutorials for building a nonprofit website using Wix, focusing on ease of use and design flexibility.
- WordPress
  - Official guide to getting started with WordPress, a popular platform for building nonprofit websites. Includes tutorials on setup, customization, and management.
  -

Mapping using Geographic Information Systems (GIS)

Getting individual microhabitats on the map can be a powerful tool to visually communicate the scale of your program. To show impact, sites can be overlain with areas of high biodiversity, income inequality, or areas of critical need. While many GIS tools exist online, it may not always be necessary to create a mapping function from scratch. GISCorps is the volunteer arm of the Urban and Regional Information Systems Association (URISA). Upon request and approval, professional members of URISA undertake short-term volunteer GIS projects for nonprofits.

Alternatively, programs may ask their stewards to record their sites on larger-scale maps such as that of Homegrown National Park. For more granularity, and for reporting on a program's impact, localized mapping may be the best way to go (see the interactive maps of the Backyard Habitat Certification Program and the Wildlife Sanctuary Program of the Northern Virginia Bird Alliance). However, note that not all stewards may want to publicize the location of their sites, so you may wish to make that information optional.

Online community for program stewards

Many programs set up an online community for program stewards to interact, celebrate triumphs, commiserate over challenges, and learn from each other. Facebook groups are a common platform. The online community can also be a dynamic and organic way in which to educate and communicate program details, such as dates for native plant sales, milestones, and educational events.

Successful online communities are moderated by staff or volunteers and have well-established rules for civility in engagement. However, the program staff we have spoken to exclaim at how amazed they are by the positive nature of interactions, the visual richness of content, and the generous contributions and expertise of lay members of the community, some of whom could be retired experts from environmental fields.

In addition, some programs offer stewards a way to continue their learning in a group setting. This may range from online webinars to in-person workshops, on topics including seed collection, winter sowing, native plant selection for specific pollinators, rain barrels, small-space design, beneficial yard management practices, and so on. This is an efficient way to continue meeting stewards where they are at, regularly upgrading their knowledge and capability for advocacy, and building community.

Signage

Yard signs are not universally applicable, such as with programs that do not have standards or criteria for certification. Elsewhere, town ordinances or homeowner association rules prohibit them. However, most programs that certify sites also offer yard signs, which can serve several purposes, such as:

- Recognizing the steward's enrollment and advertising the program
- Rewarding achievement (such as bronze, silver, and gold levels)
- Educating the community that the re-naturalized area is intentional and important
- Informing readers where to get more information

Fogel et al. (2023) found that the programs they reviewed had signs that were

"…almost all metal or plastic (97%) and could be mounted to a post. Most signs had the logo of the affiliated organization (90%), 74% had a URL, and 5% had a QR code that directed to the program's website. … The verbiage on signs had two main structures. The first was a short statement indicating that the garden was certified. The other structure was more detailed and said that the garden was certified, a statement saying what the person did to become certified and why it was important. Signs varied in the number of words from two to 68 (mean = 14; median = 8). "Habitat" was the most frequent word (found on 48% of signs), followed by "certified" (33%), "pollinator" (31%), "native plants" (29%), and the catchall "location" term (27%). The sign verbiage aligned with the broader programmatic analysis which found that helping pollinators was the most frequent aim of the programs and installing native plants the most frequent criteria."

Fogel et al. (2023) go further to recommend characteristics of effective signs:

1. Minimal words
2. A language that a lay audience will find easy to understand, and
3. QR codes to link viewers to the program's website on their phone while visiting the site.

Many programs impose a fee for the sign, whether to cover the cost of the sign or to subsidize the program (although to what extent they are a significant income is uncertain). Fees may be levied on a sliding scale, depending on the steward's capacity, ranging from no cost to up to $150 in at least one case.

Sometimes it's the physical details that matter more than the cost or composition of the sign language and imagery. Dan Pearson, of [St. Louis Audubon](#), tells us that how the sign is mounted is of great importance to their program stewards. The options are many, such as mounting on a metal or wood post, each requiring different hardware. A little forethought on how the sign will be mounted may influence the design so that bolt holes don't end up in critical places.

Where yard signs are not appropriate, another form of "signage" can be a map on the program's website that locates participating sites with, in some cases, a description and photographs of what work has been done there. See the section on maps under the chapter on websites.

Record keeping and data collection

From the time of scheduling the first site visit, through following recommendations, to recertifying the site when it has changed hands, there is a lot to keep track of. Add to this metrics on ecological or other impacts, and it becomes clear your program will need a record-keeping system that accommodates different kinds of information and spans years. These records can help new staff pick up where previous staff left off, and thus help maintain the relationship between individual site stewards and your program.

Rich Couse grappled with the issue of continuity after he took over as director of Natural Neighbors, a microhabitat program of BiodiversityWorks. The records he inherited were thoughtful and thorough but, as a nascent program, not as systematic or personal as the larger operation now warranted. For consistency, Rich and his colleague repeated an online survey, which generated an impressive 50 percent response rate. In addition, he developed a system of reaching out at the beginning of each month to the people whose anniversary fell in that month. He would schedule a follow-up visit, acknowledging that it would be time-consuming but much more informative and accurate. It will allow them to build a library of before and after photos, do another biodiversity inventory to evaluate the ecological impact of recommendations, make further recommendations, and build relationships that will foster more of a community of practice.

The follow-up visit will be a "walk and talk" aided by a standardized form for recording purposes. This form will be transcribed digitally and entered in a file back at the office where anecdotal notes will be added. This is now the same practice they use for initial site visits. They are considering experimenting with an app such as ArcGIS Survey 123, which is an electronic form for creating and sharing surveys, suitable for mobile devices. In the meantime, they synthesize their information on a spreadsheet.

The sooner you develop your own information-collecting system, the less time and effort someone will have to commit to organizing a mass of random notes and vague recollections. Here are some pointers to consider:

- Decide whether to use digital records, paper records, or a combination of both. Digital records such as Survey 123, Google Sheets, or Microsoft Excel are generally easier to organize, search, and back up. However, the field technician or a helper may find it easier to use a paper form in the field, especially if hand-held devices are not available.

- Whether digital or paper, create standardized forms or templates for recording information. This ensures consistency and makes it easier to compare data over time.

- Take before-and-after photos to visually document changes and improvements.

- Use maps or diagrams to mark specific areas where different practices were applied, such as the removal of invasive species or planting areas. Images can be downloaded from Google Earth, which can also help track changes in the surrounding landscape.

Accessing native plants

For most programs, regardless of their mission, native plants are foundational. For many programs, protecting the genetic diversity of local flora is also key, and accessing genotypes that are adapted to the local ecosystem is equally important. As the climate changes, not just plant seeds need to move, but plant genes too. That is, plants have genetic variation that allows them to adapt to new conditions. Each species needs to be able to draw from this reservoir and "select" those genes that will keep the plant viable where they are or where they will move to. Cultivated native plants ("nativars") may technically check the "native" box, but they don't address the issue of protecting genetic diversity; nativars, like any cultivated plant, are genetically identical. Put another way, nativars may attract pollinators—but what genes are those pollinators passing on to the wild population?

A chronic issue is where to get local genotype native plants. Here are six models we know of:

1. *Partnering with nonprofit nurseries*. For example, the Natural Neighbors program of BiodiversityWorks partners with Polly Hill Arboretum. A common problem for nonprofit nurseries is that they don't always know what the demand will be for natives. These partners have solved this issue by adopting a "community-supported agriculture" model, where Natural Neighbors can report how many stewards want plants for the next season. Polly Hill Arboretum can then grow enough plants to satisfy that demand and have enough left to sell independently. As reported in our Case Study, this ensures a reliable supply for Natural Neighbors and also an outlet for overage.

2. *Partnering with commercial nurseries*. Several programs have proven to local nurseries that their stewards will be a source of guaranteed sales, and can thus influence which plants they grow for those customers. In some cases, the programs subsidize discount vouchers for low-income stewards.

3. *Program nurseries*. Programs like Rewild Ojai have established their own nurseries; they engage volunteers and staff in sustainably harvesting seeds from the wild and propagating the plants. Initially, they had developed this nursery for ecological restoration projects but subsequently discovered the demand among local residents for those plants in their private yards. Similar to the CSA model, this method produces plants for private yards and also provides an outlet for overage in restoration sites. More information can be found in our Case Study.

4. *Volunteer growers*. Organizations such as Citizens for Conservation have a small handful of volunteers (among many others) who specialize in growing native plants. It is remarkable how many plants, and the diversity of them, can be generated by an individual on a small plot of land. In a scaled-up version, organizations like the Wild Woods Restoration Project and the Wild Seed Project engage volunteers to harvest and sort seeds, and to grow them privately or in the organization's nursery. Even apartment dwellers with no land can grow potted plants to supply seeds for another volunteer with land to grow.

5. *Policy-driven strategies*. The State of North Carolina adopted a regulation that requires native plants to be installed on State-owned land, such as highway verges and college campuses. Knowing there will now be a large and reliable market, the wholesale growers are expected to produce enough native plants to supply microhabitat programs as well.

6. *Native Plant Societies*. Barbara Tuset of the Northern Virginia Bird Alliance stresses the potential of partnering with local chapters of native plant societies (NPS): "While not mass producers, the multiple local chapters of these NPS are a fairly consistent source of local ecotype plants and seeds, rescued plants, education on seed collection and propagation, and advocacy efforts. They also point people to reputable local native nurseries and organize seasonal sales that bring local nurseries together to boost the diversity of plants."

Finding a reliable source of native plants is, however, only the first step. The next is affording them, especially for lower-income stewards. Native plants can be a specialty market and, as such, expensive. As mentioned, some programs subsidize native plant purchases, sometimes funded by a premium that buyers can donate to help less affluent stewards. Another less costly alternative is not to provide native plants per se but to provide seeds or seeds in starter kits. While cost-effective, probably most stewards are more likely to plant and maintain visible plants. In any event, trays of plugs and smaller plants are, of course, less expensive than full-grown plants. Whether distributed as plants and seeds, the stock should come with planting instructions and also guidance on short-term maintenance (e.g., how long to water to aid establishment) and long-term maintenance (e.g., whether thinning, pruning, or weeding may be necessary).

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