

National Wildlife Federation

Schoolyard Habitats[®] Planning Guide





SCHOOLYARD HABITATS®



National Wildlife Federation

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The mission of the **National Wildlife Federation** (NWF) is to *Unite all Americans to ensure wildlife thrive in a rapidly changing world*. The National Wildlife Federation believes that in order to save wildlife and ourselves, we need to ensure that all Americans have access to clean air and water, safe communities, easy and equitable access to nature, and protection from the ravages of climate change. These basic needs, equally necessary and urgent for all people, are foundational to bringing the conservation movement and ethos into the 21st century. For more information about the National Wildlife Federation, visit our website at www.nwf.org.

With a long and respected track record in the field of environmental education, the National Wildlife Federation is a leader in applying nature and wildlife conservation to improve K-12 student achievement, particularly in the STEM disciplines, and to foster youth leadership and environmental stewardship. Our programs allow individuals to explore, analyze, and take action on many key environmental issues facing communities, such as climate change, wildlife conservation, and environmental justice, with the end result of creating healthy, resilient, just, and thriving communities.

National Wildlife **Federation's Garden for Wildlife™** is a movement that transforms landscapes™ to benefit wildlife and people one garden at a time. Launched in 1973, Garden for Wildlife™ is our nation's longest-running and largest movement dedicated to helping wildlife locally and reconnecting our country's amazing wild spaces one person, one yard, one community, one state at a time. For more information about the program, visit our website at <https://www.nwf.org/garden-for-wildlife>.

This Guidebook was supported in part by the **Hearst Foundations**, which provide **national philanthropic resources for organizations working in the fields of culture, education, health, and social services**. <https://www.hearstfdn.org/home>.

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GROWING

Biodiversity. Awareness. Skills. Food. Cover. Community. Beauty. Habitat.

“We are helping out nature a lot! I helped plant twelve trees today, and now I have a goal to plant one million by the time I’m old.”

—5th grader at Price Elementary, Lancaster, PA



HANDS-ON ACTIVITY

Throughout the guide, you’ll find particular resources, identified by this icon.

Since 1996, the National Wildlife Federation has helped schools across the country create Schoolyard Habitats® to restore native habitat, provide access to nature, and create outdoor classrooms for learning across the curriculum. Thousands of schools are participating, and the numbers keep growing.

Why Create a Schoolyard Habitat?

Green Spaces for All

Every person should have access to green space, clean air, water, and healthy soil. But that’s not always the case, especially in communities most impacted by racism and wealth inequality. When you create a schoolyard habitat, you give every student in your school a chance to see, smell, touch, and care for nature.

Imagine what it would look like if every community in the United States developed a schoolyard habitat. All children could experience direct contact with nature, whether living in urban or rural areas and whatever their race or economic status.

Spending time in natural spaces contributes to improved mental and physical well-being, safety, and neighborhood satisfaction. Planting native gardens can increase access to green spaces, providing opportunities to connect and enjoy nature. Kids reap many benefits from exposure to natural settings, from reduced stress to enhanced social interactions.

Green Science, Technology, Engineering, Arts, and Math (Green STEAM) Learning

Green STEAM!

A schoolyard habitat doesn’t just grow vital habitat for wildlife and people. It grows a vital learning environment for students and teachers. Green STEAM connects traditional STEAM curriculum with environment-based education. In the process, learning comes alive through tangible, real-world projects and problem solving. See pages 6 and 7 for a deeper look at STEAM curriculum connections.

National Wildlife Federation’s Schoolyard Habitats® program supports on-site field trips, strengthens school and community ties, and fosters empowered, environmentally engaged students. Within your schoolyard



Before and After
Horn Elementary
School, Houston, TX.
Photo: Marya Fowler.



habitat, you'll find creative pathways for cross-curricular learning that meets state and national curriculum standards.

Climate Resiliency

When you create a schoolyard habitat, you help your community build climate resilience—the ability of communities to anticipate, prepare for, and respond to disturbances caused by climate change. The native plants in your habitat support pollinators, birds, and other wildlife. They also create shade, capture and store carbon, improve air quality, and reduce stormwater runoff.

In a schoolyard habitat, abstract ideas become real. As students dig in the soil, they can dig into concepts such as climate change adaptation and resilience. When planting a tree or building a rain garden, they help reduce climate change impacts.

Native Biodiversity

Over the past century, human actions have caused an extinction crisis.

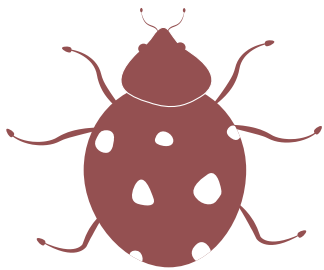
A 2019 UN Report found that “around 1 million animal and plant species are now threatened with extinction, many within decades, more than ever before in human history.”

Through your schoolyard habitat, your school community can take action to restore local native biodiversity. As students care for native plants, they



Green STEAM Activity: Observing and collecting data in the rain garden. Photo: Maria Elena Garcia.

Every step of creating a schoolyard habitat abounds with learning opportunities for students.
Photo: Anne Muller.



Our nation's longest-running and largest movement helps wildlife locally and reconnects our country's wild spaces—one person, one garden, one community at a time.

discover firsthand the wildlife that shows up and thrives, because of the food and cover (shelter) these plants provide.

Many Hands Build Success

Creating and sustaining a schoolyard habitat takes a community. The key to success? Build a diverse and community-based habitat team early on. Then, you'll have the support you need to plan, build, and maintain your schoolyard habitat over time. What care will your habitat need throughout the year? Who will maintain it during the summer months? Your habitat team can address these and other key planning questions right from the start.

Celebrate!

One of the best ways to celebrate your new schoolyard habitat is to certify it through the National Wildlife Federation's [Garden for Wildlife™ program](#). Since 1973, this program has transformed landscapes across the country to benefit wildlife and people. Our nation's longest-running and largest movement helps wildlife locally and reconnects our country's wild spaces—one person, one garden, one community at a time.

This free certification showcases the work your school has done for your community. You can receive additional recognition through the National Wildlife Federation's [Eco-Schools USA](#) program. By completing the Eco-Schools USA [Schoolyard Habitats® pathway](#) and [Seven-Step Framework](#), your school can become part of the Eco-Schools USA network.

How to Use this Guide

This guide will help you plan, build, and maintain your National Wildlife Federation Schoolyard Habitats® garden, leading you through a clear, step-by-step process. You'll also find Green STEAM learning opportunities for students and many environment-based teaching tools.

The National Wildlife Federation is committed to supporting school communities as you develop your schoolyard habitat. Whether you're a teacher, administrator, parent, or community member, we hope this guide will help transform your schoolyard into a vibrant, living resource for learning, health, and community resilience.

Green STEAM Connections

The National Wildlife Federation's Schoolyard Habitats® program calls the marriage between traditional STEAM (science, technology, engineering, art, and math) and environment based education **“Green STEAM.”**

Research shows that students are more motivated to learn and do better in school when they feel their learning is connected to a larger purpose. The environment can be a compelling context for teaching STEAM. Students who may not otherwise be enthusiastic about STEAM disciplines become inspired and often passionate about exploring the many real-world issues that environment-based education offers, from designing a schoolyard habitat to devising local recycling solutions.

STEAM learning then helps them make a difference in their own neighborhood or in the larger world.

Your schoolyard habitat project meets the real and urgent need of restoring wildlife habitat, engages students in place-based problem-solving, and connects with STEAM curriculum goals. To learn more about Green STEAM check out the National Wildlife Federation's [Green STEAM Guidebook](#).



STEAM ALERT!

Green STEAM!

Throughout this guide, the “Green STEAM!” flag will earmark activities that engage students in skills and critical thinking related to Science, Technology, Engineering, the Arts, and Mathematics.



Photo: Maria Elena Garcia.

Table 1.1 & Table 1.2

Establishing a schoolyard habitat at your school is a place- and project-based learning (PBL) experience, which involves students in real-world problem solving and finding solutions that can transform and enhance their school campus. Table 1.1 delineates the STEAM + Language Arts (LA) curriculum Core Ideas aligned with the process of designing and installing a schoolyard habitat at a school. It's helpful to visualize the entire process, from *Step 1-Engage the Community* through *Step 5-Build the Habitat*, as a whole unit. This matrix will help educators quickly identify the STEAM + LA curricular connections throughout the process and help them find the specific learning skills. Neither table specifies skills and processes by grade level—teachers are responsible for this part. Table 1.2 lists the activities included in each step and focuses on the specific skills, concepts, and practices students will undertake.

TABLE 1.1

STEAM	CORE IDEAS * Educators please refer to the national standards or your state standards to align the STEAM + Language Arts core Ideas by grade level
SCIENCE	<ul style="list-style-type: none"> • Interdependent relationships in ecosystems • Human impacts on Earth systems and structure, function, and processes
TECHNOLOGY	<ul style="list-style-type: none"> • Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts, and make meaningful learning experiences for themselves and others. • Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
ENGINEERING	<ul style="list-style-type: none"> • Defining and delimiting engineering problems • Developing possible solutions • Optimizing design solutions
ARTS	<p>ENDURING UNDERSTANDING</p> <ul style="list-style-type: none"> • People create and interact with objects, places, and design that define, shape, enhance, and empower their lives. <p>ESSENTIAL QUESTION(S)</p> <ul style="list-style-type: none"> • How do objects, places, and design shape lives and communities? How do artists and designers determine goals for designing or redesigning objects, places, or systems? How do artists and designers create works of art or design that effectively communicate?
MATH	<p>MEASUREMENT AND DATA</p> <ul style="list-style-type: none"> • Represent and interpret data • Measure and estimate lengths in standard units • Geometric measurement: understand concepts and measure area, perimeter, angles, and volume • Solve problems involving measurement and conversion of measurements • Convert like measurement units within a given measurement system
LANGUAGE ARTS	<p>WRITING</p> <ul style="list-style-type: none"> • Text types and purposes • Production and distribution of writing <p>SPEAKING AND LISTENING</p> <ul style="list-style-type: none"> • Comprehension and collaboration • Presentation of knowledge and Ideas

References:

- Science:** National Science Teaching Association. <https://ngss.nsta.org/ETSCConnectionsFull.aspx>
- Technology:** International Society for Technology in Education (ISTE). <https://www.iste.org/standards/for-students>
- Engineering:** National Science Teaching Association. <https://ngss.nsta.org/ETSCConnectionsFull.aspx>
- Arts (visual arts):** National Coalition for Core Arts Standards (2014) National Core Arts Standards <https://www.nationalartsstandards.org/sites/default/files/Visual%20Arts%20at%20a%20Glance%20-%20new%20copyright%20info.pdf>
- Math:** Common Core State Standards Initiative (CCSI) (2021). <http://www.corestandards.org/read-the-standards/>
- Language Arts:** Common Core State Standards Initiative (CCSI) (2021). <http://www.corestandards.org/ELA-Literacy/WHST/6-8/>

TABLE 1.2

Suggested activities to integrate STEAM + Language Arts practices and skills	SCIENCE	TECHNOLOGY	ENGINEERING	ART	MATHEMATICS	LANGUAGE ARTS
<p>INTRODUCTION: WHAT IS A HABITAT?</p> <p>Activity Habitats for Sale</p>	<p>Ask questions and carry out investigations of:</p> <ul style="list-style-type: none"> • living things • interdependence • habitats • adaptations 	<ul style="list-style-type: none"> • online research of animals and their habitats 		<ul style="list-style-type: none"> • design and create ads • design bulletin boards • draw animals and their habitats 		<ul style="list-style-type: none"> • write classified ads for animal habitats • literature about animals & their habitats
<p>STEP 1. ENGAGE THE COMMUNITY</p> <p>Activities 1. How Much Nature in Your Neighborhood? 2. Community Storytelling</p>		<ul style="list-style-type: none"> • use Google Earth • use Native Land Map • create blogs, newsletters, short videos, and podcasts to involve and interview the community 		<ul style="list-style-type: none"> • design bulletin board, murals, and mosaics to inform and engage the school community • design and create different art items for fundraising campaign 	<ul style="list-style-type: none"> • use Google Earth, calculate perimeter and area 	<ul style="list-style-type: none"> • write letters to invite the community • interview elders • develop community stories project • explore literature about local history and cultural traditions
<p>STEP 2. CREATE THE HABITAT TEAM</p> <p>Activities 1. Create Your Habitat Dream Team 2. Envision Your Schoolyard Habitat</p>		<ul style="list-style-type: none"> • use a landscape design app 	<ul style="list-style-type: none"> • create a 3D model 	<ul style="list-style-type: none"> • drawing 		<ul style="list-style-type: none"> • write a vision statement
<p>STEP 3. ASSESS THE SITE</p> <p>Activities 1. Who Can Live Here? Habitat Assessment 2. Schoolyard Site Inventory</p>	<p>Carry out investigations and analyze data about:</p> <ul style="list-style-type: none"> • living things • interdependence • habitats • ecosystems • soils • water cycle 	<ul style="list-style-type: none"> • Use <i>iNaturalist</i>, <i>SEEK</i>, and other online apps to identify plants and animals in the schoolyard. • landscape design app • compass app 	<ul style="list-style-type: none"> • create a 3D model 	<ul style="list-style-type: none"> • drawing 	<ul style="list-style-type: none"> • work with map scale • use different GIS tools to calculate perimeter and area 	<ul style="list-style-type: none"> • write essay about schoolyard habitat assessment findings
<p>STEP 4. DESIGN THE HABITAT</p> <p>Activity Design Your Schoolyard Habitat</p>	<p>Evaluate, design, and communicate about:</p> <ul style="list-style-type: none"> • the four elements of habitats: water, cover, places to raise the young, and food 	<ul style="list-style-type: none"> • use a landscape design app 	<ul style="list-style-type: none"> • create a 3D model • flood control, providing shade, and other problem areas 	<ul style="list-style-type: none"> • drawing 	<ul style="list-style-type: none"> • create and manage a budget materials list • calculate perimeter and area • measuring work with map scale 	<ul style="list-style-type: none"> • writing letters for fundraising
<p>STEP 5. BUILD THE HABITAT</p>		<ul style="list-style-type: none"> • make videos to record the process. Create social media livestream videos to engage the community and volunteers 		<ul style="list-style-type: none"> • garden signage • photography to record process 	<ul style="list-style-type: none"> • measure wood for garden bed construction • planting ratios • calculate volume of soil per square foot 	



Math comes alive as students build a rainwater catchment for their National Wildlife Federation Schoolyard Habitat.® Photo: Sarah Ward.



Art meets engineering when students build a 3D model of their place in the community. Photo: Fai Walker.



Students learn and practice scientific observation skills as they identify plants from their schoolyard habitat. Photo: Tina Wong.

P.S. 250 Elementary School | Brooklyn, NY

Think Like a Pollinator!



When **P.S. 250 Elementary School** received funding to create a state-of-the-art pollinator learning garden, teacher Christine Rivera was over the moon.

“National Wildlife Federation’s Schoolyard Habitats® program complements our STEAM (Science, Technology, Engineering, Art, and Mathematics) program and aligns with the NYC Department of Education’s new Amplify Science curriculum,” Rivera said. “This makes it a great fit for our school.”

To launch the project, she assembled a diverse team that included National Wildlife Federation staff, P.S. 250 students and staff, native plant experts, local architects, and the School Construction Authority. By the end of their first meeting, team members had crafted a vision statement for P.S. 250’s schoolyard habitat.

“We were [seeing that] there were hardly any plants or insects in our school yard. The insects are in other areas, like parks, because there are a lot more plants there. We need more plants so more bugs can come.” –Julian, 2nd grader

Next, first- and fourth-grade students conducted a site inventory in the proposed garden space. Fourth-graders mentored first-graders as they recorded observations.

“They defined the problem as, ‘We don’t have a garden,’ and, ‘We don’t have wildlife,’ Rivera said. “When I asked how we can solve this problem, students responded, ‘We need to build a garden. This will attract animals back to our schoolyard.’”

Green STEAM!

Encouraged to visualize habitat from a pollinator’s perspective, fourth- and second-graders created 3-D models of their imagined garden space. Then, together with local architects, they developed a shared vision, working together to overlay cut-outs of planters, benches, trees, flowers, and other garden elements on site drawings.

“This has been a great experience for all involved so far,” Rivera said. We can’t wait to unveil our new schoolyard habitat in the fall.”

“By creating habitat for pollinators, our students will be solving an important real-world problem and, in the process, they will become the new stewards of wildlife in Brooklyn and beyond.”

“I [drew] benches so we can study different kinds of trees. I made different colorful trees. We had no wildlife. I wanted to show how we can make a place where we can study wildlife.”

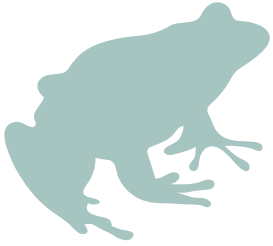
–Emma, 2nd grader



Students drew their imagined garden space. Photo: Jeannette Bryan.

HABITAT

What Wildlife and People Need to Thrive



HABITAT: where an animal finds food, water, cover, and a safe place to raise young.

A National Wildlife Federation Schoolyard Habitats® garden is a lively place. A swallowtail caterpillar nibbles the green leaf of a native spicebush. Nearby, a robin sips from a shallow pool in a concave rock. A beetle burrows beneath decaying leaves. A chipmunk curls in a burrow with her young. Wildlife finds cover, food, water, and safe places to raise young—all the essential things people need, too.

When you plant native plants that wildlife depend upon, you create habitat and begin to restore your local environment. Your actions matter! Today, more than 900 plant and animal species in North America are endangered. Habitat loss is the number one threat facing wildlife.

That's why every schoolyard habitat is important. Each one helps wildlife survive. The more schools join in, the better for reweaving Earth's tapestry of life. Students, teachers, and community volunteers have the opportunity to act as wildlife biologists and restoration ecologists right on their own school grounds.

ECOSYSTEM: An ecosystem is made up of all of the living and nonliving things in an area. This includes all of the plants, animals, and other living things that make up the communities of life in an area. An ecosystem also includes nonliving materials—for example, water, rocks, soil, and sand. A swamp, a prairie, an ocean, and a forest are examples of ecosystems.

Animals tend to find their habitats within an ecosystem. For animals, an ecosystem is like a neighborhood, where a habitat is an address or home within that neighborhood. Human activities and development can disturb habitats to the point where animals can no longer meet their basic needs.

The Power of Biodiversity

BIODIVERSITY: the variety of living organisms in a given area. Biodiversity includes every living thing—from humans to organisms we know little about, such as microbes, fungi, and invertebrates.

As gardeners and stewards of our land, we have never been so empowered to help save biodiversity from extinction, and the need to do so has never been so great. All we need to do is plant native plants."

—Doug Tallamy,
"Gardening for Wildlife,"
Wild Ones Journal

Variety isn't just the spice of life, it's an essential ingredient. Our ecosystems are strongest when they are rich in the variety of species that belong there. They are weakest when biodiversity declines and we lose species.

Generally, places with high biodiversity have a greater variety of food, nesting sites, and cover. That gives wildlife more options for survival when times are tough, especially with extreme weather events and other impacts of climate change. With planning, a schoolyard habitat can bring a whole lot of biodiversity to a small space, making your community better able to handle environmental changes.

The Four Essentials

Knowing that all wildlife need some combination of food, water, cover, and places to raise young, how do you provide the four essentials? The best place to start is to mimic nearby nature. That means choosing native plants as much as possible (see sidebar).

Food

Choose native plants as nature's wildlife feeder. Supplement native plants with bird feeders for student observations and data collection. Students delight in hummingbirds sipping sugar water and woodpeckers eating suet. Match the right seed blend for the feeder. Black sunflower seeds are excellent. Avoid blends with milo, sorghum, and red or green millet (typically not eaten). Keep all feeders clean to keep birds healthy.

Why Native Plants?

Native plants are an essential component of the habitat you're creating. Native flowers, grasses, trees, and shrubs support more food and cover for local wildlife, because they evolved together. Plants that are native to the soils and climate also require less fertilizer, water, and effort in controlling pests.

Did you know? A native oak tree can support over 550 species of butterflies and moths. Those caterpillars are what 96 percent of nesting songbirds depend on to raise their young. One pair of Carolina chickadees may feed their brood as many as 9,000 caterpillars!

Tip: Plant several kinds of native plants that offer different seasonal foods, like seeds, berries, nuts, and nectar. Butterflies need both nectar flowers and host plants for egg-laying and for hungry caterpillars.

Search by zip code to find native plants that host the highest numbers of butterflies and moths to feed birds and other wildlife where you live:

National Wildlife Federation's Native Plant Finder.

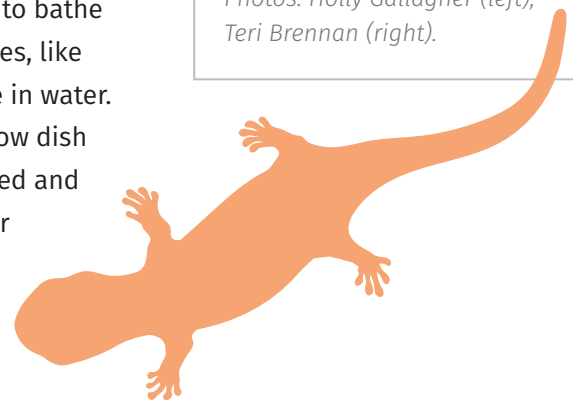
www.nwf.org/NativePlantFinder/



Water

Wildlife needs clean water for drinking year-round. Birds also need to bathe for feather care. Some species, like amphibians and insects, live in water. A simple birdbath or a shallow dish of water works well, if cleaned and refilled daily. Place the water

Planting a variety of native plants boosts the biodiversity of your schoolyard habitat. Photos: Holly Gallagher (left), Teri Brennan (right).





GARDEN FOR WILDLIFE

Gardens that Benefit Wildlife and People

Native plants, eco-friendly gardening practices provide natural sources of the four elements of habitat:

Oaks support over 500 species of butterflies and moths and feed and shelter other wildlife.



food



water



cover



raising young

National Wildlife Federation's Certified Wildlife Habitats® include these elements and can support 2X the amount of wildlife.

Songbird babies rely on thousands of caterpillars and other insects supplied by native plants.

Roughly 30% of native bee species are pollen specialists that restrict their diets to specific native plants.

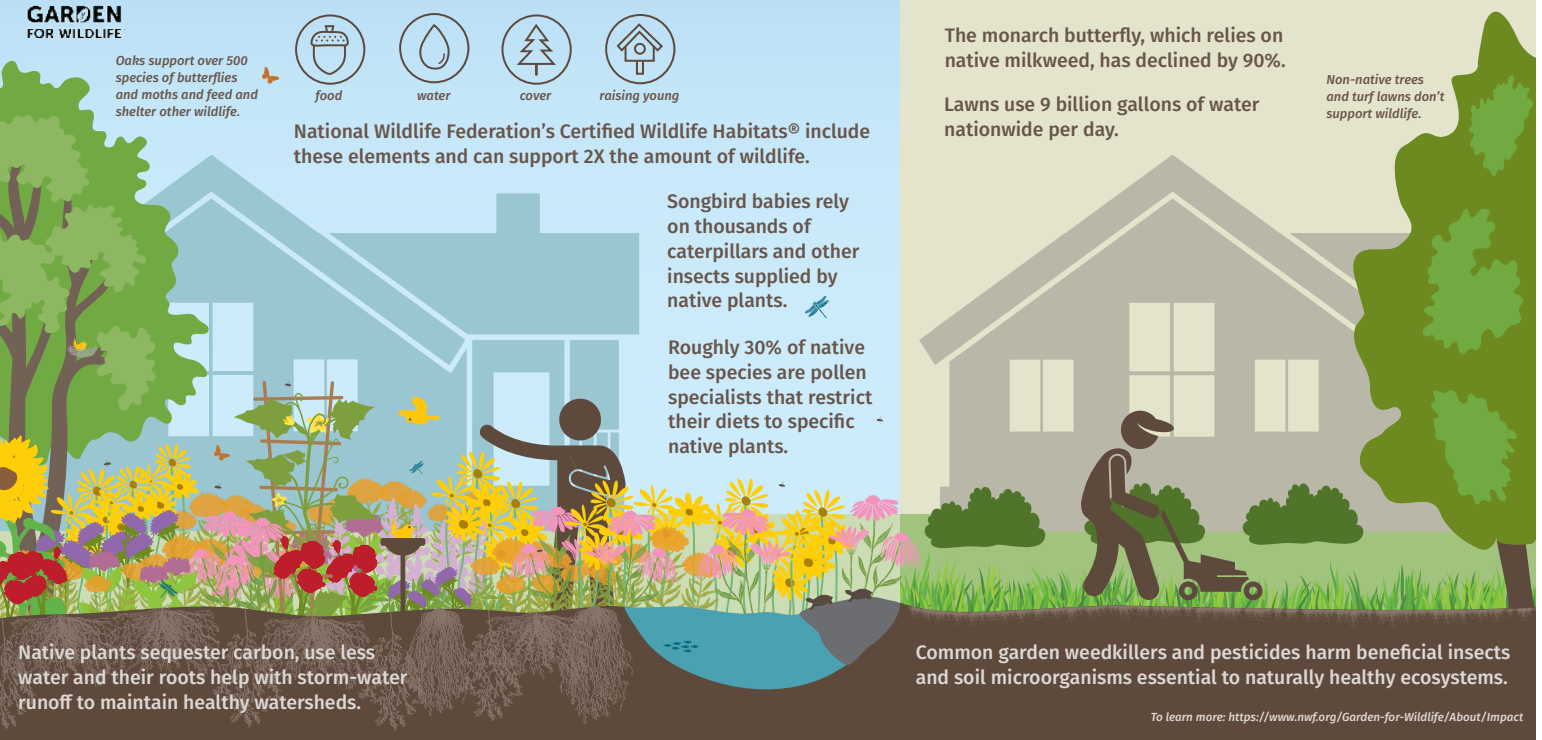
Conventional Landscapes

1 million acres of wildlife habitat are lost to suburban development annually.

The monarch butterfly, which relies on native milkweed, has declined by 90%.

Lawns use 9 billion gallons of water nationwide per day.

Non-native trees and turf lawns don't support wildlife.



Native plants sequester carbon, use less water and their roots help with storm-water runoff to maintain healthy watersheds.

Common garden weedkillers and pesticides harm beneficial insects and soil microorganisms essential to naturally healthy ecosystems.

To learn more: <https://www.nwf.org/Garden-for-Wildlife/About/Impact>

Native plants are wonderful for wildlife, from home yards to schoolyard habitats. Find out more: <https://nwf.org/Garden-for-Wildlife/About/Impact>



container about 10 feet from dense shrubs or other cover that predators may use. Birdbath heaters are important in areas where temperatures drop below freezing. If you have natural water sources, look at enhancing or restoring them for wildlife. Many schools choose to create small ponds that support wildlife diversity and offer hands-on learning.

Cover

Just like people head for cover in pouring rain, blizzards, or searing heat, so do wild animals. They also require places to hide from predators, and predators need cover to catch their prey. The ideal cover habitat includes native plants growing as they would in nature—think clumps, layers, and

thickets. Leave dead plant stalks standing in winter. Rock piles, brush piles, stone walls, hollow trees, and logs offer hiding places and support insect life.

Places to Raise Young

To survive, wildlife must successfully raise the next generation. That means offering habitat for all phases of animal life cycles. Tailor the habitat to the wildlife you want to invite. For example, chipmunks need places to burrow and keep their young tucked in safe in the ground. Can you safely maintain a standing dead tree for cavity nesters? Attach birdhouses and nesting shelves to posts, trees, or buildings. Plant dense pockets of shrubbery to conceal nests and juvenile birds, which are the most vulnerable to predators.



Photo: Carolyn Millard.



Habitats for Sale

A Game for Understanding Habitats

Summary

Students write classified ads for animal habitats, and match animals to their habitats

Grade Level

K-5, 6-8

Time

1 hour 30 minutes

Learning Objectives

Students will be able to:

- Understand the concept of habitat and what living things need to survive.
- Creatively imagine and describe different habitats for different animals.
- Describe several ways living organisms adapt to their habitats.

Subjects

Science, Art, Technology

Skills

Observation, description, analysis, research, communication, creativity

Materials

- Reference books or online resources on animals and their habitats
- Pictures and descriptions of different habitats
- Paper and pencils
- Crayons and markers
- Real estate ads from local paper or online

Materials for younger students (K-2)

- Bulletin board supplies
- Tempera paints and brushes
- Construction paper and tape
- Markers, crayons, or colored pencils
- Pictures of animals

Background

Habitat is the place where an animal finds **food, water, cover, and a place to raise young**. In cities and towns, development can disturb habitats to the point where animals can no longer meet their basic needs.

Procedure

1. If your students are not familiar with the concept of **habitat**, you might ask them what they need in order to survive or live (feel safe, healthy, and cared for). Discuss how all animals depend on these core components of food, water, cover, and places to raise young.
 - Discuss how animals build special homes as part of their habitats (such as beaver lodges, bird nests, fox dens). These homes provide cover from weather, protection from predators, and places to raise young.
 - Point out that some animals (such as coyotes, fish, deer) do not actually build special homes, but use existing habitat features. Can they think of animals that live this way?
2. Tell your students they will play a guessing game and then create their own game—trying to match animals to their habitats.

- a. Read aloud and show a few sample real estate ads from a newspaper or online to give students an idea of what they will be creating.
- b. Read the make-believe examples below and ask them to guess which animals might answer each ad:

Great Grasslands

Prime grassland available in Africa. Loaded with antelope, springboks, zebras, and other tasty prey. Close to refreshing water holes and shady clumps of acacia trees. Lots of wide-open territory. Great for new pride. Call soon before this great buy is snatched up. **(Answer: Lion)**



Photo: Sarah Ward.

Underground Castle

Tunnels available in the Smith family's backyard. Home to juicy earthworms and other tasty creatures. Loose, moist soil for easy tunneling to expand your space and no pesky cats in the neighborhood. This super backyard is available immediately. **(Answer: Mole)**

- c. Explain to students that they will create a classified ad describing an animal's habitat and/or home. Write animal names on slips of paper or find pictures of animals (such as squirrel, hedgehog, bat, bison, rat, whale, snake, owl, leopard, dolphin, duck, weasel, wolf, penguin, woodpecker, earthworm, spider, crab).
- d. Working individually or in small groups (2-3), students should choose an animal and create their own classified ad in a way that would appeal to their animal, including appropriate food, water, cover, and a place to raise young, **without giving away the identity of the animal**. Provide reference books/online resources to support their ad development.
- e. Create a list of all the animals students selected for their habitat ads, and display the list for all students to see. Each student or group will then read their classified ad aloud to the group, and the group will guess which animal goes with that ad. Discuss how some ads might fit more than one animal and how some animals might adapt to fit into a habitat that is not their ideal home.

f. After everyone has had their turn, have each student draw the habitat he or she wrote about, including the animal, and post in the classroom.

For Younger Participants (K-2)

Create a large tree on a bulletin board. Have students paint the trunk, background, and leaves (or cut and paste construction-paper leaves). Give each student (or small group) at least one picture of an animal that lives in or around a tree (such as chipmunk, squirrel, owl, robin, ant, fox, porcupine, bat, spider, treefrog).

Have students color and cut out their animals and add them to the area in or around the tree where they think the animal lives. Talk together about what each animal might eat, where the animal would find water and cover, and whether the tree provides adequate space for that animal to live.

Ask students if they also want to add other things to the bulletin board to create a better habitat for the animals (such as a stream or pond, other plants, fallen logs). Mention that some homes in and around the tree might fit more than one animal and how some animals might adapt to fit into a habitat that is not their ideal home (for example, a raccoon in a city).

GROWING

Collaboration. Equity. Green space. Observation. Nest Sites. Art. Habitat.



ENGAGE
the
community



CREATE
the
habitat team



ASSESS
the site



DESIGN
the habitat



BUILD
the habitat



DEVELOP
a maintenance
plan



CELEBRATE
success



STEAM Curriculum Connections

Technology: Use school-approved online platforms to design and create blogs, newsletters, podcasts, short videos, etc. to engage and inform the community.

Art: Design and create different art items as a fundraising campaign; design and create bulletin boards.

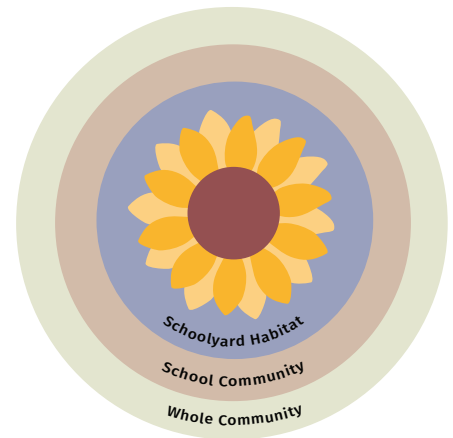
Math: Calculate perimeter and area.

Language Arts: Apply persuasive and creative writing skills; conduct an interview; write letters to the community, newsletters, and interview elders.

The Community Connection

Your National Wildlife Federation's Schoolyard Habitats® garden has the potential to grow and strengthen relationships within your school and throughout your community. Reach out to the broader community from the beginning of your planning process. By doing so, you'll build connections that can bridge cultural differences, transcend language barriers, and enhance the schoolyard habitat. When you draw on community members from all walks of life, you tap valuable sources of advice, expertise, financial support, and practical help. When communities are healthy, wildlife flourishes too.

When you invite community members to take part in your schoolyard habitat project, you cultivate local support for your school. You also sow seeds of understanding about the importance of natural habitats within your community, and get much needed maintenance support throughout the year.





Many schoolyard habitat programs incorporate a day or week of community celebration and action. Even more important is the day-to-day involvement the school and local community can provide. Photo: Teri Brennan.

How can you include the local community in your schoolyard habitat?

Green STEAM!

Here are just a few ways:

- Survey community members about your proposed schoolyard habitat. What's their vision for the habitat? How might it be used for learning? For after-school use? On page 21, you'll find a *Community Storytelling* activity to guide this survey process.
- Hold a series of events during the year that invite community members to volunteer their help, such as planting and clean-up days.
- Share photos and stories about your schoolyard habitat on the school's website, social media sites, and school/parent newsletters. Be sure to update regularly.
- Post and update photos and stories about your schoolyard habitat program in multiple, visible locations inside the school.
- Use school assemblies to launch schoolyard habitat activities and share progress.
- Include vegetables and herbs in your garden. Grow diverse varieties that represent the different cultures in your community. Create a mini-farmers market. Offer free vegetables to help feed families in need.
- **Celebrate!** Invite parents and community members to explore your schoolyard habitat with imaginative gatherings, like a "Sip and See" open house where visitors sip fresh lemonade (mimicking pollinators) as they tour the pollinator-friendly gardens.



How Much Nature in Your Neighborhood?

Safe and Equitable Access to Nature

Summary

Students assess their community's safe and equitable access to nature.

Grade Level

3-5, 6-8, 9-12

Time

2 class periods (60 minutes)

Learning Objectives

Students will be able to:

- Locate and identify nature areas within a 1-2-mile radius of their community.
- Assess the accessibility (or lack of) to nature areas within their immediate community.
- Analyze possible solutions to improve/promote safe and equitable access to nature within their community.

Subjects

Social Studies, Geography, Math, Technology

Skills

Observation, description, analysis, research, data collection, measurement

Materials

Option A

- Clipboard and pencil
- Worksheet (provided)

Option B

- Computer and Internet access
- Worksheet (provided)

Background

When addressing social and environmental inequities in our communities, access to nature needs to be part of the conversation. Gentrification and housing discrimination are symptoms of systematic racism. Many families of color have been pushed into impoverished urban areas, far from parks and green spaces.

Public parks, green spaces, and the outdoors in general belong to everyone. Unfortunately, access is often not equitable for people of all races, genders, immigration status, ability, and income levels. By identifying and then eliminating barriers, we can assure all communities receive the healing power of nature. Access to nature should be a right, not a privilege.

Guiding Questions

1. How much time do you spend outdoors (at a beach, nature center, playground, forest, community garden, etc.)?
2. What are the benefits to spending time outdoors?
3. How often do you and your family or friends visit a public park? Is this important for you and your family?
4. Is it easy or hard for you and your family to get to a park or outdoor space? How do you get there (walk, bus, car, etc.)? How far away is it? Does it cost money to get in?
5. Why do you think it is important to have access to the outdoors and nature?
6. After students complete the investigation below, consider: Do people in your community have equitable access to the outdoors and nature? If not, why and how could this be changed?



Photo: Tina Wong.



This simple assessment tool will help determine if your school and/or community has equitable and safe access to nature. For a more in-depth study, explore the engaging, interactive links below.

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[Trust for Public Lands: Explore Park Access in Your Neighborhood.](#)

How many people in your community can access green space within a 10-minute walk? Learn this and much more!

[Model My Watershed.](#) Learn about the plants, animals, streams, soils, terrain, climate, and water quality in your community.

Procedure

Option A - Needs to be accompanied by an adult

1. Go outside and take a 10-20 minute walk in any direction.
2. Complete the *How Much Nature in Your Neighborhood?* worksheet, page 20.

Green STEAM!

Option B - Internet connection necessary

1. Using Google Maps (satellite view) or the Google Earth app, look for green spaces within a 1- to 2-mile radius of your home.
2. Complete the *How Much Nature in Your Neighborhood?* worksheet, page 20.

Explore Solutions

Brainstorm with students at least three actions that could improve access to nature and the outdoors in your community. Example, the city can improve/add public transportation routes to parks and public lands.

How Much Nature In Your Neighborhood?

Are parks and other natural places in easy reach of the people in your community?

Note: While designed for a teacher or other adult to lead the whole class, this activity can be adapted for older students to complete individually.

Choose one of the following ways to explore this:

1. With an adult, go outside and take a 10-20 minute walk in any direction and record your findings in the chart below.
2. Use Google Maps (satellite view) or the Google Earth app to look for natural areas within a 1-2 mile radius of your home. You'll need internet connection to do this. Record your findings in the chart below.

Steps for using Google Earth

- Go to the Google Earth application and click on the project tab. Watch the tutorial video on how to set-up a project.
- Once you have saved your project, click on the ruler icon (bottommost icon) on the left-hand side of the screen. When you do, a gray box will appear in the upper right corner. Click the drop-down arrow and select "miles." Click on your starting point on the map, then use the tool to measure a 1-2 mile distance from there in any direction. Double-click on your chosen end point. Zoom in to see what parks, green spaces, and gardens you see along the route.

Distance: How many miles is the green space from your school/community?

Pathways: Are there uninterrupted sidewalks, bike lanes, or trails to safely reach the site?

Accessibility: Can people with physical limitations or baby strollers safely access the space?

Safety: Do you feel safe? Is the site free from unlawful activity, vandalism, etc.?

Type of Green Space	Distance	Pathways (yes/no)	Accessibility (yes/no)	Safety (yes/no)
Parks				
Nature Playground				
Community garden, botanical garden				
Lakes and rivers				
Beaches - ocean				
Nature trails or habitats				
Private green spaces, open to the public				
School garden or playground open to the community				



Community Storytelling

“Knowing that you love the earth changes you, activates you to defend and protect and celebrate. But when you feel that the earth loves you in return, that feeling transforms the relationship from a one-way street into a sacred bond.”

–Robin Wall Kimmerer, *Braiding Sweetgrass*

Summary

These optional activities will help anchor your National Wildlife Federation Schoolyard Habitats® garden within the larger community and encourage students to learn about and tell the stories of their community. Students will use research, interviews, and creative projects to understand their community’s relationships to the environment.

Grade Level

3-5, 6-8, 9-12

Time

Varied and flexible. Part one will take two+ class periods. The student project section will vary based on student choice and scope, but advise for two class periods over a two-week time period.

Learning Objectives

Students will be able to:

- Begin to understand their community’s local and natural history.
- Recognize and name their community’s cultural traditions, environmental issues, and leaders.
- Develop a community-stories project that centers around the individuals and groups who visioned and built the schoolyard habitat and/or who use and maintain the schoolyard habitat.

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STEAM!

Subjects

Language Arts, Social Studies, History, Art

Skills

Research, writing, communication, listening, collaboration, creativity

Introduction

A schoolyard habitat nourishes wildlife, and it can also deeply nourish people. While a schoolyard habitat performs critical ecological functions, it can also meet community needs and provide space for people to gather together and connect with nature. Your schoolyard habitat can, for example, support local food sovereignty, help manage stormwater, feature artwork, and host community events.

Through the Community Storytelling activity, students examine the community’s relationships to nature, plants, and the environment through research, community investigations, and interviews. By incorporating community wisdom and cultural traditions, your schoolyard habitat can foster appreciation of local history and become a place to uplift and honor these community stories.

Partnering with community members or organizations is essential to this activity. Elders, community activists, historians, journalists, artists, cultural institutions, environmental justice organizations, and other non-profit partners can offer valuable insight and are often happy to partner with schools. These activities lend themselves well to interdisciplinary collaboration—consider teaming up with art, social studies, language arts, or media teachers.

Part 1: Community Research

During the first part of the activity, the students will get to know their community via research, community interviews, and/or field trips. Please note, these activities can be completed in any order and can be adapted to curriculum units or frameworks already in use.

(continued)

Procedure

Research the Community

1. Students can be divided into groups of 2-4 to complete these activities. Encourage teams to use primary and secondary resources (including internet, books, newspaper clippings, maps, and historical archives) for their research and determine the best methods for outlining their work. For younger students, select a few resources, as well as 1-2 research questions for them to explore.

2. Below are prompts to help teams get started or support refining their research questions. Teams can also develop their own research questions.

- a. Who are the traditional Native inhabitants of the land on which our community or school is located? The Native Land Map is one resource to help you find this answer (<https://native-land.ca/>).
- b. How has the local environment changed over time? How have the land and water supported or sustained people in our community?
- c. How do people interact with wildlife or nature in our community?
- d. What are the events, celebrations, or spiritual traditions that honor the Earth and nature in our community?
- e. What ways do people in our community cultivate plants for food, shelter, medicine, religion, or other purposes?
- f. Does our community have environmental issues that affect people or wildlife?
- g. What is the relationship between historical knowledge, nature, environmental issues, and our plans for our schoolyard habitat?
- h. Who can help us answer these questions?

3. After students complete their research, schedule time for groups to share their findings with the whole class. Groups can produce presentations. Encourage creativity beyond traditional slideshows and reports.

Conduct Interviews

1. Based on their research, community investigations, and family connections, teams can create a list of people to interview: elders, family members, community gardeners, artists, journalists, historians, environmentalists, and more. Depending on the number of people available to interview, small groups can conduct interviews or the full class can participate. If time allows, students can practice letter-writing and send requests to potential interviewees.

2. Schedule time for the interviews.

3. Prepare for the interviews. Pass out the Community Interview worksheets to groups. The worksheet includes four introductory questions. Encourage students to generate additional questions or select a few from the list below to help them get started.

Sample Interview Questions:

- Can you share any family, cultural, or spiritual traditions that you celebrate or make you feel more connected to nature?
- Do you garden or cultivate plants? Can you share more about your relationship to these plants?
- What types of wildlife species should we try to attract in our schoolyard habitat?
- Does our community have any environmental issues that concern you?
 - How do those issues affect people in the community?
 - How can members of the community work together to improve these issues?

Explore the Local Community

1. Plan in-person or virtual field trips to historic sites, natural areas, or community gardens.

2. Visit or invite community leaders and guests from environmental justice organizations and local cultural or historical organizations to your classroom.

Extension Activity:

Community Storytelling

Now that students have conducted research and interviewed local people, they can plan a project that will share their community's stories and connect them to the schoolyard habitat. In the process, students will deepen their understanding of environmental and social issues, community resilience, and how to effectively make their voices heard.

Students can complete these projects while creating the schoolyard habitat or after its completion. Collaborate with artists, language arts or media teachers, family members, or local professionals to help with this project.

Working in groups, participants can reflect on their community interviews and research and discuss which story they think is important to tell. The Community Storytelling Action Plan worksheet will help them with the planning process. Each class or group of students should develop a project plan that outlines important partners, steps, and deadlines.

Community Storytelling Project Ideas

- Write a blog, newspaper article, or short story.
- Design and create a mural, mosaic, or other artwork for the schoolyard habitat.
- Create a community map, featuring sites important to the community, including the schoolyard habitat.
- Plant heirloom or heritage crops and plan a farmer's market, harvest celebration, or community potluck.
- Present a play, dance, or musical performance in the schoolyard habitat.
- Film a short documentary or video about the community and the creation of the schoolyard habitat.
- Develop an oral history project or a podcast using interviews with elders, community leaders, and activists.
- Plan storytelling events in the schoolyard habitat: invite grandparents, families, or other community members to read or share stories.

Resources

- [Honor Native Land: A Guide and Call to Acknowledgement](#)
- Native Lands Maps: [Native-Land Map](#) or [Tribal Nations Map](#)
- [Farming While Black](#)
- [Seed Savers Exchange](#)
- [Environmental Justice, Explained](#) [video]
- [Ethnobotany](#)



Photo: Sarah Ward.

“We’ve already lost too many trees, houses and people... Your community—you owe something to it.” –Hattie Carthan, community organizer and environmentalist

Community Interview

In your group, generate a list of questions about your community and a list of people you think might be able to help you answer them. Conduct an interview with each person (at least 3 different people), recording their answers carefully. Be prepared to present your findings to the whole group. The interview questions below can get you started, but be sure to add some of your own!

Interviewee Name _____

1. How long have you lived or worked in this community?

2. What is important for people to know about this community (history, people, stories, etc.)?

3. Can you share any memories, experiences, or places that have made you feel connected to nature in our community?

4. What types of features or activities should we plan in our schoolyard habitat to honor the community?

5. Can you recommend any resources that might help us with this project?

6. Question:

7. Question:

8. Question:

Community Storytelling Action Plan

1. What is the story we want to tell about our community?
2. Why is it important to tell this story?
3. What are some ways we can incorporate this community knowledge into the design of our schoolyard habitat or the activities that will take place there?
4. How can we tell this story and share it with others (via artwork, video, newspaper article, etc.)?
5. Who might be able to help us?

Action Plan

What steps will we need to take to complete this project?

1. Step One:
2. Step Two:
3. Step Three:
4. Step Four:
5. Step Five:

Step 2: Create the Habitat Team

GROWING

Curiosity. Outdoor Learning. Team Work. Understanding. Cooperation. Habitat.



ENGAGE
the
community



CREATE
the
habitat team



ASSESS
the site



DESIGN
the habitat



BUILD
the habitat



DEVELOP
a maintenance
plan



CELEBRATE
success

**Green
STEAM!**

STEAM Curriculum Connections

Note: This step concludes with a STEAM activity: **Envision Your Schoolyard Habitat**

Technology: Use an online landscaping design app to design Schoolyard Habitat.

Engineering: 3-D model construction of schoolyard habitat garden design.

Art: Drawing of schoolyard habitat garden design.

Language Arts: Compose the schoolyard habitat garden vision statement.

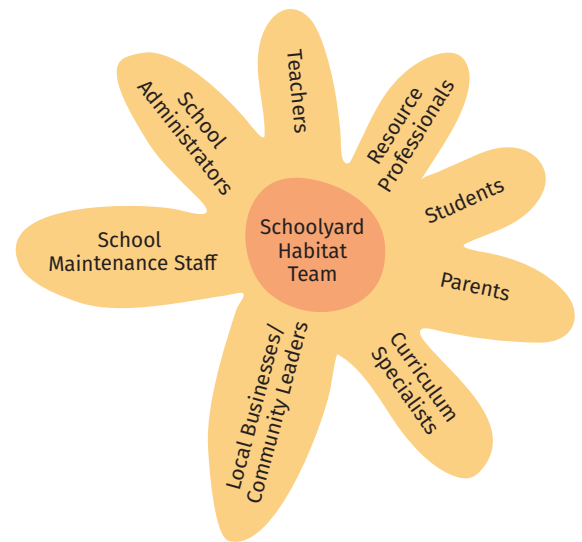
You've taken the important first step of engaging your community. Next, you'll need to identify a core group of committed individuals with complementary skills to form your habitat team. Their dedication will ensure your schoolyard habitat thrives over time.

Team Selection

Your habitat team members will help plan, fundraise, communicate, build, plant, and maintain the schoolyard habitat. But who to ask? Seek both enthusiasm and diversity. The following school and community groups offer useful skills, resources, and knowledge.

Students

Students should form the core of your habitat team. Empower students to be leaders, with the support of adults.



Bring them in right away. The more they contribute, the more they will feel ownership in the schoolyard habitat and confidence in their leadership abilities.

- Involve students from different grade levels.
- Make sure they have roles throughout, from planning to planting and beyond.

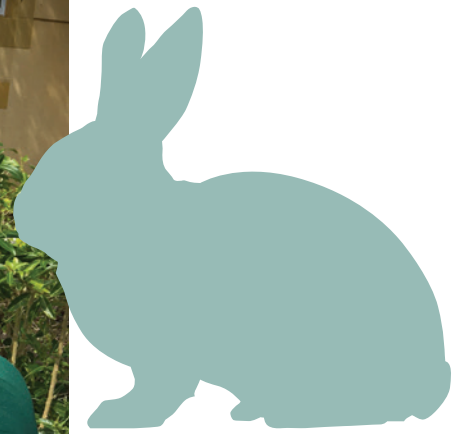


Photo: Maria Elena Garcia.

Educators

Think of educators as facilitators who strike a balance between pushing the project forward and stepping back to allow students to take charge.

- For flexibility and consistency, include at least two educators.
- Connect educators with school curriculum specialists, ensuring that the outdoor classroom dovetails with curriculum.

Administrators

School officials are critical for your team. They offer insights into budgets, future building plans, liability issues, community relations, and fundraising opportunities. You'll find they will need little convincing to participate in your project, which will:

- Improve school image and offer cost-savings;
- Offer teaching opportunities across the curriculum and give students the chance to be leaders; and
- Build lasting connections with the community.

Maintenance Staff

Who knows the details of the school grounds better? Plus, they may provide support and equipment to construct and care for the plantings. Be sure to let them know that students and community volunteers are generally responsible for upkeep of schoolyard habitat sites—not the maintenance staff.

- Describe the project as fully as you can. Invite their critical skills for long-term success.
- Discuss, clarify, and amplify their important role.

Parents and Family Members

Not surprisingly, you'll find a high level of excitement in this group, offering volunteer support and cross-generational learning. Grandparents and older family members tend to have more free time to commit to the schoolyard habitat.

- Find out who might support the program at different times—during and after school, on weekends, and over holidays and summer breaks.
- Invite parents and family to share their knowledge, skills, and experience. You'll likely find a rich pool of expertise.

Students are instrumental on the habitat team. Allowing students to engage from the beginning allows them to develop critical leadership, communication, and collaboration skills, while helping to define the direction of the project. Every step of planning, designing, and implementation of the schoolyard habitat allows students to learn along the way and gain these critical skills, along with a greater sense of stewardship.

“Our vision for our National Wildlife Federation’s Schoolyard Habitats® project is to provide a natural area that is aesthetically pleasing, where wildlife can be observed and appreciated. This site will provide students with hands-on experiences that enhance all areas of the curriculum.”

–Example one of a Vision Statement

“Our vision for our National Wildlife Federation’s Schoolyard Habitats® project is to create a wildlife habitat with the purpose of attracting native species back to our school community and provide our students with firsthand knowledge and experiences of the natural world, thereby fostering their innate curiosity in an outdoor classroom environment.”

–Example two of a Vision Statement

Local Businesses and other Community Organizations

Many successful schoolyard habitats depend on community partners. These businesses and organizations can provide technical support, material contributions, small grants, volunteers, and other in-kind donations. In turn, they earn positive recognition. Everyone benefits from strengthened relationships between school and community.

- As your project progresses, remember to send letters of appreciation for contributions.
- Find ways to publicize the generosity of local businesses.

Resource Professionals

Who can lend expertise and ideas to brighten, deepen, and enhance your schoolyard habitat project? Who might provide role models and mentors for students and open their eyes to potential careers? Your best bet for a community-based project is to look for local experts. Here’s a starter list to consider:

- County foresters, community gardeners or farmers, cooperative extension agents, naturalists, wildlife biologists, landscape architects, local historians, and horticulturists.

Curriculum Committee/Specialists

To make sure your schoolyard habitat will serve teachers and students, identify curriculum needs up front. Curriculum may influence the planning and building in ways you might not have considered. To prepare the staff, the school may want to offer professional development training



Photo: Fai Walker.

on environment-based education and managing outdoor classrooms.

- Consider creating a subcommittee of educators, curriculum, and literacy specialists.
- Keep teachers informed during planning and building. Ask for their ideas for outdoor learning.

The **Habitat Team Planning Worksheet** on page 30 will help you create your dream habitat team.

Put your Team to Work

With your habitat team in place, it’s time to nail down the specific roles of each member. Call a team meeting to set your vision and goals. Develop a strategy for individuals to help at every stage. How often should you meet? Who needs to attend? This is your time to set an efficient and timely schedule.

Use the **Envision Your Schoolyard Habitat** worksheet on page 31 to help your team get started. This visioning exercise can be completed by students in your classroom and by habitat team members.

Brixner Junior High School | Klamath Falls, OR

Sparking a Monarch Revolution



It all started when Ecology Science teacher Mrs. Contreras challenged her 7th- and 8th-grade students to flood the school with posters about the importance of native habitat to monarch butterflies. Mulling their proposed media blitz, one student asked, **“Like a Revolution? A Monarch Revolution?”** And so the Monarch Revolution Eco-School Club was born.

Meeting monthly before school hours, this club of students, teachers, and staff decided to create an official Monarch Waystation—critical habitat for monarchs and other pollinators. Using grant funds and donations from community partners, Brixner students planted 120 native flowering plants and trees, including native milkweed, which monarch caterpillars depend on for food. They installed weed barrier fabric and mulch, tree support stakes, border blocks, plant labels,



Photo: Morgan Parks.

stepping stones, and pathways. They’ve also planned rain barrels, educational signs, outdoor seating, and a dripline irrigation system for the future.

Students have led all phases of the schoolyard habitat, cultivating a strong sense of ownership and pride in their “Pollinator Paradise.” Ecology students paired up with students in Brixner’s special education program, and these “Peer Pals” worked together on such projects as garden stepping stones. Art students have practiced outdoor sketching in the Monarch Waystation, and the garden has been showcased during school events, spreading ecological awareness through the community. Moving beyond the garden, the Eco-School Club has partnered with the Brixner Booster Club to support other sustainability efforts on school grounds.

The National Wildlife Federation [Monarch Curriculum](#) (NGSS aligned) gave students hands-on experience with soil and water testing, sustainable conservation practices, plant and habitat health, and invasive species control, all while learning about monarch conservation. Mrs. Contreras developed a [classroom science website](#), where she posts ecology lessons, including a [Monarch Butterfly Unit](#), and [Monarch Waystation](#) updates. Visit her website for ideas on starting your ecological revolution!

Mulling their proposed media blitz, one student asked, “Like a Revolution? A Monarch Revolution?” And so the Monarch Revolution Eco-School Club was born.



Photo: Morgan Parks.

Create Your Habitat Dream Team

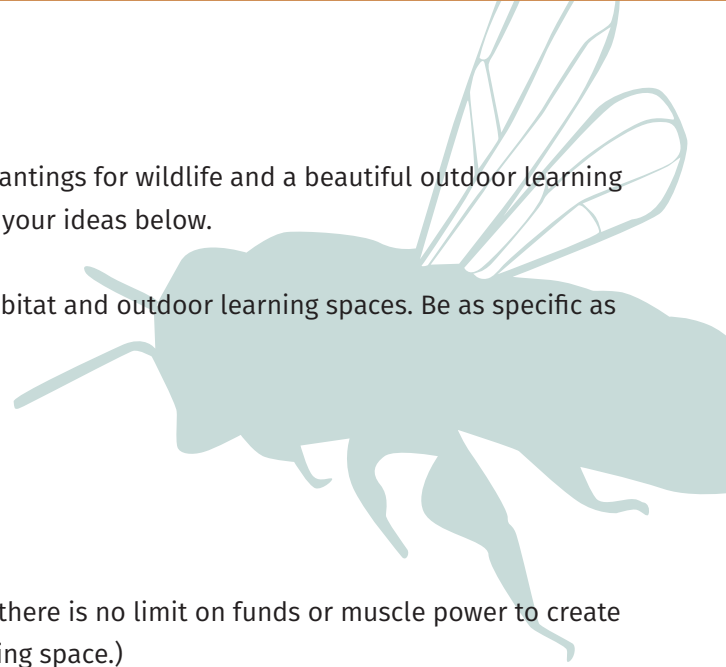
Use this worksheet to brainstorm members for your schoolyard habitat team. Students should be a core component of your team. Other community members will add skills, strength, and support to the work the students take on. As you think about potential team members, consider the skill set they offer and the roles they can help fill, like communications and publicity, fundraising, photography, volunteer coordination, on-going maintenance, treasurer, secretary, and so on.

Students	Role(s)	Contact Information
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
Teachers	Role(s)	Contact Information
1.		
2.		
3.		
Administrators	Role(s)	Contact Information
1.		
2.		
Custodial/Maintenance Staff	Role(s)	Contact Information
1.		
2.		
Parents	Role(s)	Contact Information
1.		
2.		
3.		
Local business/Organization Representatives	Role(s)	Contact Information
1.		
2.		
3.		
Local experts	Role(s)	Contact Information
1.		
2.		
3.		

Envision Your Schoolyard Habitat

Our school is planning to create a schoolyard habitat with native plantings for wildlife and a beautiful outdoor learning space for all of us. Help create the best possible habitat by sharing your ideas below.

1. What is our schoolyard like now? Describe existing wildlife habitat and outdoor learning spaces. Be as specific as you can. If you have access to a camera, you can attach photos.



2. What would your ideal schoolyard habitat be like? Imagine there is no limit on funds or muscle power to create it—the sky's the limit! (Use the back of this worksheet for more writing space.)

As you picture your habitat, consider these questions:

- Where on the school grounds do you imagine the habitat garden? What would the entrance be like?
- If you were walking through your imagined schoolyard habitat, what would you see, smell, hear, and touch?
- What kinds of animals do you hope the habitat will attract?
- How would people and animals use your schoolyard habitat? How do you hope they'll feel in the habitat?

3. Your Vision Statement for the Schoolyard Habitat

A **vision statement** describes the clear and inspirational long-term vision for what you want to create. In a vision statement, you imagine something that does not yet exist (for example, your completed habitat), and you describe it in a way that inspires people to make it a reality. In Question #2 above, you described the specifics of your ideal habitat. Now step back. Can you sum up its most important elements in a sentence or two?

4. Team Vision Statement for the Schoolyard Habitat

Working with your classmates, or other members of your habitat team, share your individual vision statements (read them aloud and write them on a chalkboard or flipchart). You'll likely see overlapping ideas and common threads. Use them to write a clear, concise shared vision statement for your schoolyard habitat.



Envision Schoolyard Habitat Through Art, Engineering and Technology

Summary

Students imagine their schoolyard habitat and visually render it through art, 3-D models, or computer software.

Grade Level

K-5, 6-8, 9-12

Time

1-3 class periods, depending on the activity

Learning Objectives

Students will be able to:

- Visualize the features of their ideal schoolyard habitat.
- Describe how the schoolyard habitat will be used by people or wildlife.
- Design or construct a representation of their imagined schoolyard habitat.

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Subjects

Art, Engineering, Technology

Skills

Creativity, collaboration, problem-solving

Materials

For drawings or paintings

- Art supplies: paper, colored pencils, paint, etc.

For 3-D models

- A variety of natural objects or upcycled materials such as pine cones, twigs, pebbles, paper, cardboard, etc.
- Glue, tape, scissors

For computer models

- Landscape design software or application

Now that your students have described in words their vision for the schoolyard habitat, they can give that vision shape, color, and form through art, engineering, and technology. You're still in the dreaming phase of the project, so encourage them to **dream big** and imagine what the habitat would look like if budget were not an issue.

1. Draw & Paint Your Habitat

Get a copy of the school's site plan/property map from the school facilities manager or administration. Or search your school's address on Google Earth to zero in on your school grounds. Make black and white copies of the map or aerial image.

Working individually or in small groups, have students draw their imagined schoolyard habitat designs directly onto the blueprint or aerial image. Bring the drawings to life with colored pencils, paint, cut paper, or mixed media.

2. 3-D Model Your Habitat

Working in small groups (3-4 students), have students collaborate to construct 3-D models of their imagined schoolyard habitat garden. As much as possible, use natural objects (like pinecones, twigs, and pebbles) and recycled materials to create your model habitat.

3. Computer-Model Your Habitat

Have students work in pairs to design their schoolyard habitat using design software or an online design application. SketchUp, iScape, and Garden Planner are a few of the many landscape design applications to consider.

Landscape design apps are widely used by people in a number of eco-careers, including landscape designers, horticulturists, and environmental urban designers. Students who dive into the computer-modeling project might be interested in speaking with or shadowing a local community member who does this kind of work.

You can use this activity as a lively student competition to generate ideas for the schoolyard habitat.



Photo: Christine Riviera.

GROWING

Passion. Mapping Skills. Creativity. Climate Resilience. Flowers. Habitat.



ENGAGE
the
community



CREATE
the
habitat team



ASSESS
the site



DESIGN
the habitat



BUILD
the habitat



DEVELOP
a maintenance
plan



CELEBRATE
success



STEAM Curriculum Connections

Science:

- Core Idea: Interdependent relationships within habitats
- Skills: Systems thinking, observation, data collection, classification, identification, test analysis (soil testing)
- Concepts: Food chains, food webs, habitat, habitat elements (food, cover, water, places to raise young), soil science, chemical reactions

Technology: Use field guide apps (*like iNaturalist*) to support field observations of flora and fauna. Use online landscaping design app to create base map of schoolyard habitat

Engineering: 3-D model construction of base map of the selected site

Art: Draw a base map of the selected site

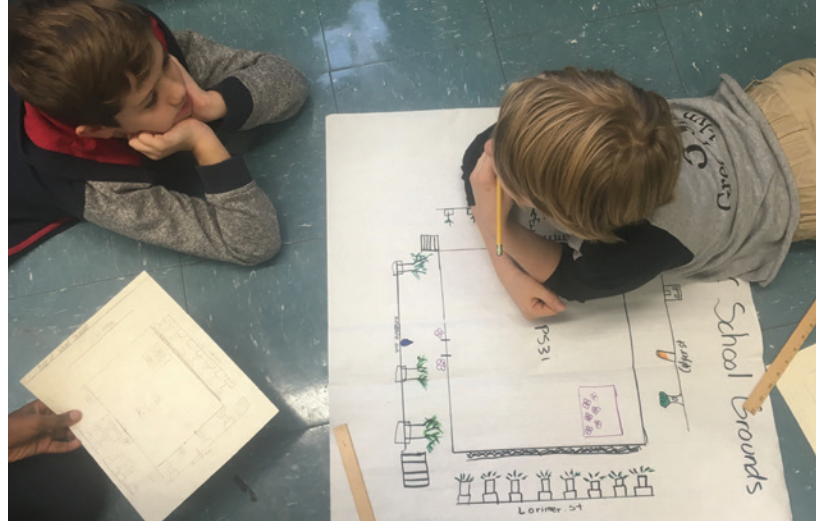
Math: Measure and draw to scale

You've assembled the habitat team and developed your vision for the schoolyard habitat. Now it's time for students to study the current state of the schoolyard. First, they'll conduct a **habitat assessment** (Who Can Live Here? pg. 36).

They'll then complete a **site inventory** (pg. 39) with related mapping activities to create a "big picture" of the observations and data collected. These important educational steps help the habitat team identify the schoolyard's opportunities, and



Photo: Jessica Burt.



Photos: Morgan Parks (left), Alison Schuettinger (upper right), Teri Brennan (lower center), Sarah Ward (bottom right).

constraints and select a site. If you have already chosen a site for your schoolyard habitat, the students' site inventory will give the habitat team a thorough analysis of existing conditions.

Through the site assessment process, students will participate in a real-world design project and understand how designers, engineers, horticulturists, and other STEAM professionals approach their work.

Start with a Base Map

Try to obtain an architectural site plan of the school grounds. The custodian or district facilities office may have access to a blueprint. This plan will show most existing features, including buildings, property lines, sidewalks, driveways, parking lots, bus circle, playing fields, and

utility easements. This will reduce the amount of initial site drawing you need to do. Also, once you have determined the best site for your habitat, it may reduce the amount of measuring needed (and will provide accurate numbers against which to compare student-made measurements).

If you can't find a copy of the site plan, you will need to create a rough base map from scratch by sketching the school grounds and recording on the map all of the information described above. See Appendix A, page 70, *Pacing, Baseline Mapping, and Mapping to Scale*, for strategies to develop maps.

Once you have a base map, all students and adults involved in the site inventory will use copies of this map to record their inventory findings. This way, everyone will have the same frame of reference when noting new information.

COMMUNITY CONNECTION

Invite a local landscape architect or designer to visit the class and share their process for conducting a site inventory and creating base maps.





Who Can Live Here? Habitat Assessment

Summary

Students assess the schoolyard as a habitat for local wildlife.

Grade Level

K-4, 5-8

Time

2 class periods (60 minutes)

Learning Objectives

Students will be able to:

- Locate habitat elements on the schoolyard.
- Assess the schoolyard's potential as a suitable habitat for a specific animal.
- Identify an area of the schoolyard that would include the most habitat elements for a specific animal.

Subjects

Science/Biology, Environmental Studies, Geography

Skills

Observation, description, analysis, research

Materials

- Student worksheets
- Clipboards
- Pencils
- *Who Can Live Here?* animal cards, Appendix B, page 72 (optional)
- Flags or paper, 4 different colors per group (optional)

Background

For an animal to survive, it must be able to find adequate habitat that provides **food, water, cover, and a safe place to raise its young**. Your schoolyard may already offer habitat for some animals—students may have seen squirrels in nearby trees or heard songbirds in springtime. Through this activity, students will consider the habitat your schoolyard provides for these animals, and what they and other species may lack. This is the first step in restoring wildlife habitat.

If your schoolyard does not have green space, consider conducting two assessments, one in the schoolyard and one in a nearby park or green space so students can compare the two sites. Encourage the team to brainstorm how they might add key habitat elements to their schoolyard.



Photo: Sarah Ward.

Procedure

1. Review the four basic elements of habitat (food, water, cover, and places to raise young) and the importance of each for an animal's survival.
2. Pass out the *Who Can Live Here?* worksheet (page 38). Explain to students that they will complete these as they explore the school grounds, and that they will look at the school grounds as if they were a local animal species in search of habitat. If their research will be confined to certain sections of the school grounds, state the boundaries of the study area.
3. Divide the class in either pairs or groups of three. Each group chooses a different wildlife species common to the area. Alternately, groups can choose a *Who Can Live Here?* animal card (Appendix B, page 72) or develop their own cards.
4. Before going outside, review any safety rules with the class. If the area is large, consider setting up boundaries for the activity.
5. Using field guides, wildlife apps, or storybooks as references, students should look for the types of food, water, cover, and places to raise young that their animal requires and complete their worksheet. Younger participants can place a different colored flag on each of the places where they find one of the four habitat elements.
6. Once all students are finished, tour the schoolyard together and discuss the habitat elements and their ratings.
7. Which areas on the schoolyard have the most habitat elements? How many different species might each section support? Ask each student to decide if the schoolyard would provide part or all of their animal's habitat. What habitat elements may need to be added to improve or create adequate wildlife habitat?

Assessment

Have students write a short essay about their findings in the schoolyard. Does the area meet their animal's needs? How can the schoolyard be changed to offer better habitat? Younger students (K-3) can draw pictures of their animal's habitat.



Photo: Maria Elena Garcia.

Who Can Live Here?

You are a _____ (choose a wild animal). In order to survive, you need **food, water, cover, and a place to raise your young**. Explore the schoolyard. Describe the habitat elements you find and where you find them. Then, decide whether or not you could make your home here.

Food Source

- What food do you eat? _____
- Does this site provide this food? Yes / No
- If yes, list foods found here: _____
- Are foods available to you in one or more seasons? Yes / No
- If yes, which seasons? Winter / Spring / Summer / Fall

Rate "Food" from 1 to 10: ("10" is excellent quality; "1" is poor quality.) (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

Water

- Does this site provide water for you? Yes / No
- If yes, list water sources found here: _____

Rate "Water" from 1 to 10: ("10" is excellent quality; "1" is poor quality.) (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

Cover

Animals need different types of cover to protect them from weather or predators. Trees, tall grasses, rock piles, dead trees, and human-made structures can all provide cover for wildlife.

- List possible places where you might find cover here: _____

Rate "Cover" from 1 to 10: ("10" is excellent quality; "1" is poor quality.) (1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

Places to Raise Young

- Does the site provide good places for you to raise young?
- List possible places where you might raise young here: _____

Rate "Places to Raise Young" from 1 to 10: ("10" is excellent quality; "1" is poor quality.) (1) (2) (3) (4) (5)
(6) (7) (8) (9) (10)

Living with Humans

- Do people often visit, work, or play here? Yes / No
- If yes, list their activities: _____

Can you live here if these activities are happening? Explain. _____

Habitat Rating

- Add up each habitat component rating. What is the total habitat rating for you at this site? _____
- Based on your study, could you live on this site? Yes / No
- Why or why not? _____

How could this site be changed to make it a better habitat for you? _____



Schoolyard Site Inventory

Summary

Green STEAM!

Students obtain or create a base map of the schoolyard, then conduct a site inventory of the grounds, mapping natural and human elements. Students then assess the schoolyard for its habitat potential and identify a site for their schoolyard habitat.

Grade Level

K-12, adults

Time

3-7 class periods (depending on size of class, team structure, and size of area to be mapped)

Learning Objectives

Students will be able to:

- Identify existing natural and human-made elements in the schoolyard.
- Create a basic map of the area.
- Select an appropriate site for creating a habitat area.

Subjects

Science, Math, Geography, Art

Skills

Research, analysis, observation, description, mapping

Materials

- Paper, pencils, markers or colored pencils
- Field guides or plant identification apps (iNaturalist Seek is a good option)
- Clipboards (optional)
- Compass
- Poster board or chart paper
- Graph paper
- Tracing paper (optional)
- Sample site drawings
- Student worksheets
- Rulers
- Outdoor thermometer (for Sun/Shade assessment)

Materials for Younger Participants

- Field guides with large color pictures
- Chart paper or cardboard
- Colored clay, construction paper, and/or building blocks
- Odds and ends to represent different parts of site
- Scissors, glue

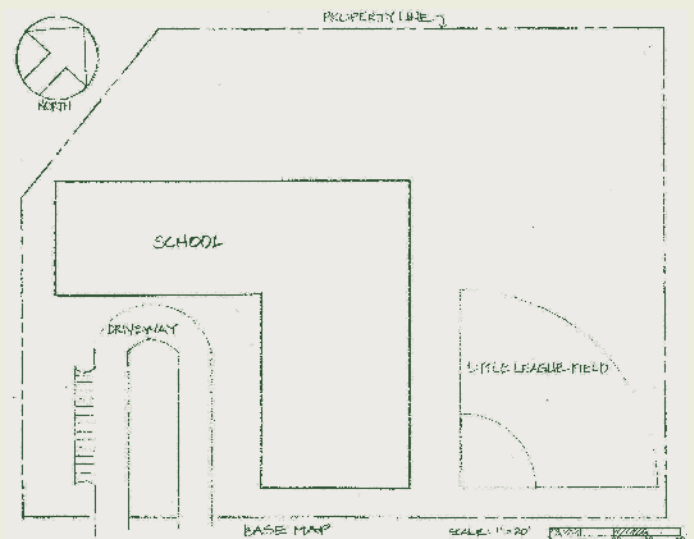
Procedure

1. Study the school grounds at various times during the day.

Have students consider the following questions and make notes in their journals. If they do not yet have journals, they should create simple ones.

- How do you feel when you are in the school grounds? Comfortable? Exposed?
- Where is your favorite place? Why?
- Where is your least favorite place? Why?
- Where is the quietest spot? The noisiest?

2. **Obtain or create a base map** of the site (see *Start with a Base Map* on page 35 and Appendix A, page 70, for map-making strategies). Google Earth, Google Maps, or other GIS tools can also be used to view and measure the schoolyard.



Simple hand-made base map.

(continued)

Students can help create this map, but you should make sure that it accurately reflects the site. The outline map can be a fairly simple sketch of the area (see samples). The map should include all borders, such as property lines, roads, etc., and any large permanent features such as buildings (showing exits and entrances), fences, power lines, and ball fields. The map can be drawn on a large poster board or chart paper.

3. Make reduced-size copies of the base map on graph paper to serve as the site assessment maps for students. Alternatively, teams can trace the base map onto tracing paper and use that traced map for recording their site assessments. Maps can be layered over the base map once teams have completed their site assessments.

4. Assess Site Features. Your students will be assessing seven aspects of your schoolyard: site history and climate, land use and traffic patterns, topography, sun/shade, wildlife, vegetation, and soil. Depending on the size and age level of your group, and time available, you may wish to have all your students do each assessment, perhaps one each class period. Or, you may wish to divide your students into small teams, each charged with investigating and mapping a different feature of the schoolyard. When all groups have finished conducting their research, they will assemble everything together to create one detailed map.

Show sample maps or drawings to illustrate each feature that a team will map.

5. If you are using teams, divide students into small groups. Explain to students that each team will be responsible for surveying and mapping different features of the site. You will need the following teams:

a. Site History & Climate Team: *Note, this team will need to be able to conduct research to answer their questions. Alternatively, students can complete this as a group before inventorying the site.*

b. Land Use and Traffic Patterns Team: Observe foot, auto and bicycle traffic, as well as human activities.

c. Topography Team: Observe contours and slopes of the site.

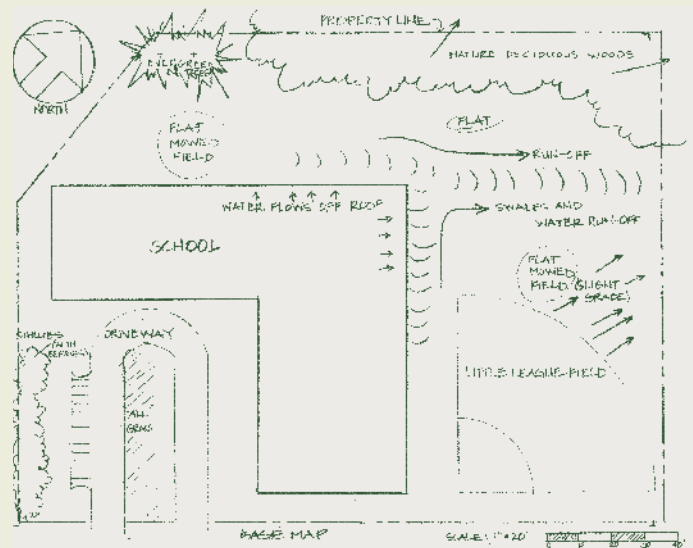
d. Vegetation Team: Observe plant diversity and abundance.

e. Sun/Shade Team: Observe the amount of direct sunlight falling on different parts of the schoolyard.

f. Wildlife Team: Survey the wildlife that already live in or use the schoolyard for habitat.

g. Soil Team: (optional) *Note, only complete the Soil Inventory if you're certain the soil is not contaminated. See Appendix C, page 73.*

To emphasize Green STEAM career connections, consider assigning each group a team name related to their task; for example, Climatologists, Botanists, Geologists, etc. Alternately, each team can choose a name for themselves, relating to what the team will do.



Base map with topography, traffic patterns, and vegetation added. Note the North arrow in the upper left corner.

6. Show the outline map to students and explain in detail what they see. Students should be able to identify several landmarks on the map.

7. Give each group the appropriate inventory worksheet to assist in their investigation. Go through each sheet and explain what each item is and why it may be important. For example, traffic patterns are important because you do not want your habitat site in the middle of a high traffic area. Explain that the features can be drawn on the map using symbols or circles. Each type of site feature should be drawn in a different color.

Schoolyard Inventory: Site History and Climate Team

Team Name: _____

Knowing your schoolyard's climate and history is important for planning its future. For example, if the site is located near an industrial center, soils may contain residues of chemicals generated by the industry. This knowledge helps you understand how your schoolyard habitat can improve environmental conditions in the community.

1. How long has this site been used as a schoolyard?
2. Who are the traditional Native inhabitants of the land on which our community or school is located? The Native Land Map can help you find this answer (<https://native-land.ca/>).
3. What type of ecosystem was here before the school was built? What species of wildlife lived here many years ago?
4. In the past, were any industrial centers near or on the school site? If yes, explain.
5. What current environmental problems does our community face? *Examples include air pollution, habitat loss, water pollution (including sewer overflows), toxic sites, or severe weather like hurricanes, droughts, or flooding.*
6. Is our community experiencing the effects of climate change? If yes, what are some of the impacts on people or nature?
7. Why should we consider the site history and climate when we plan our schoolyard habitat?
8. How can our schoolyard habitat address some of the environmental issues described above or enhance climate resilience?

Climate resilience is the ability of communities to anticipate, prepare for, and respond to disturbances caused by climate change. To improve climate resilience, we can assess how climate change will create climate-related risks, and take steps to cope with these risks.

Schoolyard Inventory: Land Use & Traffic Patterns Team

Team Name: _____

Investigate how people use the schoolyard and how they move through it. Draw each observation on your base map and record your answers below. Consider visiting the site at different times of day—especially during recess or after school—to observe the full range of activities that take place.

1. How do people use your school grounds now? What types of activities take place in the schoolyard, and where?

2. Do classes take place in the schoolyard? Yes / No

a. If yes, where?

3. Are there pathways, sidewalks, or trails?

4. What are the surface types in the schoolyard or on your site?

a. Pavement

b. Lawn/turf

c. Soil

d. Mulch

e. Other:

5. Is the schoolyard accessible to people who use wheelchairs or have limited mobility?

6. How and where do people move through the schoolyard?

a. Walking

b. Bicycles

c. Scooters/skateboards

d. Cars/vehicles

e. Other:

7. How might these traffic patterns affect the location of a potential schoolyard habitat site?

8. How do your site's current neighbors use their land? How might that affect your National Wildlife Federation Schoolyard Habitats® project?

Schoolyard Inventory: Topography Team

Team Name: _____

Topography refers to the shape and features of land surfaces. It can include natural formations like hills and valleys, or human-made features like roads and ditches. Survey the topography of the schoolyard. Record your answers below, and mark on the map where you find each topographical feature.

1. Do you see hills, valleys, or slopes? Yes / No

2. Where does water flow when it rains?

3. Are there areas that usually hold puddles? Yes / No / Not Sure

a. If yes, why do you think puddles form there?

4. On your map, note any pipes, rain gutter downspouts on buildings, storm drains, and sewers.

5. What questions do you have about the shape of your schoolyard and how it will affect your choice of site?

How will you answer these questions?

6. Why should we consider the topography and flow of water when we plan our schoolyard habitat?

Schoolyard Inventory: Vegetation Team

Team Name: _____

Survey all the **plants** growing in the schoolyard. Use a plant guide or app (like [Seek](#)) to help you identify the kinds (species) of plants. Note each observation on your base map and record your answers below.

Plant Type	Tally	Total
Deciduous trees (those that lose their leaves in fall)		
Evergreen trees (those that keep their leaves or needles all year)		
Shrubs		
Grass/Ground Cover areas		
Landscaped areas or gardens		
Edible gardens/food crops		
Natural areas		
Other:		

1. Do you know the names of any of the plant species (types) you see? Use a field guide or the [Seek app](#) to help you identify them. List them here or in the table above.

2. Are any of the plant species native to your region? If yes, circle their names in the list above.

A native plant is a species that naturally evolved in a given region over thousands of years and thrives in the natural soils, precipitation, weather, and climate of that region.

3. How many different plant species did you find? The higher the plant diversity (number of different plants), the more likely it is that your schoolyard will attract a variety of wildlife.

4. What else do you want to know about the plants, trees, and flowers that you found here?

Schoolyard Inventory: Sun/Shade Team

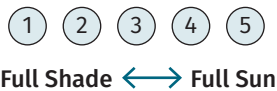
Team Name: _____

Choose a sunny day to do your investigation. Using a scale of 1-5, record on your map how much sun is falling on different sections of the schoolyard. Places in full shade (no direct sunlight) would be a “1”, while those in bright sun (no shade) would be a “5”. Use a thermometer to record air temperatures at each location. Try to repeat your observations and measurements at two other times of day to compare. If you have access to a camera, take photos of the site at different times of the day.

In addition, you can use online tools or apps to view the sun’s position in relation to the schoolyard throughout the day.

www.suncalc.org

www.sunsurveyor.com/



Time	Location	Sun/Shade Rating	Air Temperature

1. What questions do you have about the temperatures and sun/shade conditions you discovered?

2. Why is it important to know which areas are sunny or shady before choosing plants for your habitat site?

3. How will sunny and shady areas change with the seasons? Will these changes have an effect on how the schoolyard habitat can be used? Explain.

Schoolyard Inventory: Wildlife Team

Team Name: _____

Survey the wildlife already living in or using the schoolyard for food, water, cover, or places to raise their young. Conducting a survey of wildlife will help you create or enhance your schoolyard habitat to support these animals.

1. Closely look and listen for animals in the schoolyard. They can be tiny or large—insects, birds, amphibians, mammals, and more. What animals do you see or hear? What are they doing (Behavior)? Complete the chart to record and tally your wildlife observations. Draw symbols on your map to indicate where you observed these wildlife species.

Animal	Tally	Total	Behaviors

2. Animals need food, water, cover, and places to raise their young. For example, berries on shrubs, fallen seeds, puddles, nests, or burrows. Do you see evidence of these habitat elements in the schoolyard? Indicate the types of habitat elements you observed in the schoolyard in the chart below. Draw symbols on your map to indicate where you observed them.

Habitat Element	Food	Water	Cover/Places to Raise Young	Animal this Habitat May Serve
<i>Example: Maple Tree</i>	<i>Seeds, leaves, buds</i>		<i>Branches, leaves, bark</i>	<i>Insects (caterpillars, etc.), birds, squirrels, deer</i>

3. How do you think seasonal changes may affect the wildlife or habitat elements you observed?

4. What questions do you have about the wildlife species you observed in the schoolyard?

Schoolyard Inventory: Soil Team (optional)

Team Name: _____

Gather at least 3 soil samples from different areas of your schoolyard at least 3 days after the last rain. Pick areas that have different kinds of vegetation, or different topography—(such as a hill, under a tree, or in a grassy area). Compare the color, texture, and moisture content of each sample. If possible, obtain pH-testing materials for gathering this information. The pH measures the acidity of the soil. Since different plants like different levels of acidity, knowing the pH can help determine what types of plants can grow there.

Sample Location	Color	Texture (loam, sand, silt, clay)	Moisture	pH



Photo: Carolyn Millard.

GROWING

Empathy. Communication. Connection. Place-based knowledge. Seeds. Habitat.



ENGAGE
the
community



CREATE
the
habitat team



ASSESS
the site



DESIGN
the habitat



BUILD
the habitat



DEVELOP
a maintenance
plan



CELEBRATE
success



STEAM Curriculum Connections

Technology: Use an online landscaping design app to create the final schoolyard habitat garden design

Engineering: 3-D model construction of schoolyard habitat garden final design, design for flood control, hazard mitigation, etc.

Art: Draw schoolyard habitat garden final design

Math: Calculate budget and costs of project

Language Arts: Persuasive writing - letters for fundraising

Now that your habitat team has selected a site, conducted an inventory of its features, and outlined a vision for the schoolyard habitat, you're ready to design and plan the habitat in detail. The activities in this chapter will guide the habitat team in choosing the plants, features, and outdoor classroom infrastructure for the schoolyard habitat. During the planning process, the team should maximize the educational potential of the site and design the space for the various activities that will take place there.

Incorporate students' ideas and needs into the design as much as possible. Encourage them to make the site "user friendly" by anticipating and meeting the needs of visitors—whether it's a class studying insects, a student group growing

food for school lunches, or families finding a peaceful spot to sit and watch birds.

Due to time or budget limitations, it may not be possible to install all of the features of the schoolyard habitat at once. You might plant a small area first, and over a period of time add structures such as seating, bird feeders, and water features. Developing the site in phases gives everyone a chance to watch the habitat grow and to plan or fundraise for larger components of the final design.

The design also needs to locate a nearby water source for the newly installed schoolyard habitat garden. This will be crucial to the success and maintenance of the garden. During the first three months, the garden should be watered every other day.

PS 34 Oliver H. Perry | Brooklyn, NY

Green STEM All the Way



Transformed from hard-packed dirt to a vibrant outdoor classroom, PS 34's National Wildlife Federation Schoolyard Habitats[®] garden grew from the vision of 4th and 5th-graders during a 10-week Green STEM unit. After a soil remediation project left the school's front garden with a blank slate of healthy soil, Green STEM teacher Ms. Marshall saw a ripe opportunity to engage students in a real-world design project. Together with National Wildlife Federation Sustainability Coach Tina Wong, she planned a unit to guide students through the design process.

Students worked in teams to research, brainstorm, and design their habitat, which included fruit trees, plants for pollinators and local wildlife, and plenty of seating for a full class or families to gather. They presented their research and designs to their classes and a panel of guests. The completed National Wildlife Federation Schoolyard Habitats[®] garden incorporated several student ideas, including milkweed plants, fruit trees, a reading nook, Little Library, and stump seating.

The design process helped students develop skills—like collaboration, problem-solving, leadership, and public speaking—that prepare them for STEM careers.

Week	Topic	Outcomes
1	Introduction a) Overview of project b) Assess the Site: Schoolyard Inventory	A local landscape architect visited the classes to describe how she designs landscapes.
2	Research Topics included outdoor classrooms, upcycled materials in the garden, healing gardens, pollinator gardens, butterfly gardens, fruit trees, native plants in New York City, and soil	Student teams were assigned research topics related to garden design, outdoor classrooms, or ecology. They used internet resources to research their topics.
3	Presentation	Student teams created PowerPoints and presented their research to the class.
4	Envision the Schoolyard Habitat: Concept Plan Student teams began to visualize the components of the schoolyard habitat.	Teams answered these questions: What do want our garden to be used for? What would we like to see in the garden? What kinds of materials will we need?
5	Finalize Concept Plans	Teams finalized activities and materials list for their concept plans.
6	Design the Schoolyard Habitat Teams began their designs.	Teams used site plans of the school to create landscape plans drawn to scale.
7-8	Design the Schoolyard Habitat Teams completed their design plans.	Teams created PowerPoints to present their plans.
9	Preliminary Judging of Design Plans	Teams presented their design plans to their classes. One team from each class was selected to present the following week to a guest panel.
10	Final Judging of Design Plans with Guest Panel	Teams presented their design plans to a panel of guests, including a landscape architect, environmental educator, and horticulturist. Guests judged the team's designs as well as their presentations.



Design Your Schoolyard Habitat

Summary

Students develop a detailed plan for the schoolyard habitat.

Grade Level

K-4, 5-12

Time

2 class periods (60 minutes)

Subjects

Science, Math, Engineering, Art

Skills

Critical thinking, description, analysis, creativity, communication

Materials

- *Design Your Schoolyard Habitat* worksheets
- Clipboards
- Pencils (2 colors for each group)
- Tape measure

Learning Objectives

Students will be able to:

- Explain the activities that will take place in the schoolyard habitat.
- List the specific habitat elements that will be featured on the site.
- Communicate and present their schoolyard habitat designs to members of the school community.

Procedure

1. This activity is best completed outdoors, at the schoolyard habitat site.

2. Explain to students that it's time to plan all the details of the schoolyard habitat, including the habitat elements for wildlife and the layout and structural features that will facilitate its use as an outdoor classroom.

3. Divide the students into groups. Pass out clipboards, worksheets, and copies of the base map.

4. Students in each group should talk together about all of the features listed in the design checklist to determine which they'd like to include in their final design.

5. Use a measuring tape to determine the space and size limitations for each feature.

6. Once the students complete the site plan checklist, they can use a copy of the base map to draw their final designs on the site map, creating a **landscape plan**. Explain that landscape architects and designers create final designs for their projects to scale. These drawings help clients or users of the space visualize what it will look like and help determine the quantity of plants and materials required to complete the design. Use the same symbols or drawings from your previous design to show the structures, water sources, and plants that will be included in the schoolyard habitat design.

7. Be sure to schedule time for students to present the schoolyard habitat designs to each other, to the school community, and to project partners.

Community Connection

Invite a horticulturist or community gardener to visit the class and share their process for designing gardens.

Adaptations for Younger Students (K-4)

The full activity and worksheet may be difficult for students in grades K-4. Consider adapting this activity by completing the detailed site plan as a class. Discuss the purpose of each potential element of the design and whether to include it in the schoolyard habitat.

Design Your Schoolyard Habitat

Team Name: _____

This worksheet will help you plan the details of your schoolyard habitat. First, answer the questions below to make sure you are ready to get started. Then, place a **checkmark** next to the items you plan to add to the schoolyard habitat.

Important questions to consider:

- Where will the schoolyard habitat be located?
- Are you creating a new habitat or enhancing an existing garden or National Wildlife Federation Schoolyard Habitats® site?
- What kinds of wildlife (species) would you like the schoolyard habitat to support?
- What types of activities will take place in the schoolyard habitat?
- Are there environmental conditions the schoolyard habitat will help improve?
- Is there a functional water source nearby (within 100 feet) for plant watering?
- Will any areas need to be cleared of plants, turfgrass, or structures to create the schoolyard habitat?
- Is the space free of any safety or building/construction concerns? (Check with your school's facilities team.)
- Do you have a preliminary plan for maintenance of the schoolyard habitat?
- Who are the community partners helping on this project?

Schoolyard Habitat Design checklist:

In the checklist below, place a **checkmark** next to any the features you **plan to add** to the schoolyard habitat.

1. General Layout and Infrastructure

Plan the general layout/design of the site to understand how people will move through the space, where planting beds and structures will be located, and how classes can successfully use it as an outdoor classroom.

Classroom and Activity Areas: How will people use the schoolyard habitat?

- Is the site accessible and usable to people with diverse abilities? See Appendix D, page 74 for accessibility considerations. Yes / No
- Is there enough space for full classes to gather or for students to comfortably and safely study, observe, or play in the space?
 - The site has enough space for a full class (~30 students) or more.
 - The site can accommodate small groups spread out.
 - The site can accommodate a few individuals.
- What types of structures are needed to support learning, play, or other activities?

<input type="radio"/> Tables	<input type="radio"/> Other Types of Seating:
<input type="radio"/> Benches	<input type="radio"/> Natural play areas (sand box, sensory beds, loose parts, etc.)
<input type="radio"/> Chairs	<input type="radio"/> Teaching tools (chalk boards, etc.)
<input type="radio"/> Stumps	<input type="radio"/> Other:

(continued)

Planting Beds: Where will plants grow? Check all the items you will need to create planting beds:

- | | |
|--|--|
| <input type="radio"/> Plants will be planted directly in existing soil | <input type="radio"/> Soil and/or compost |
| <input type="radio"/> Raised beds or containers | <input type="radio"/> Mulch |
| <input type="radio"/> Edging/border materials (for example, bricks) | <input type="radio"/> Approximate dimensions/size of planting beds _____ |
| <input type="radio"/> Fencing | <input type="radio"/> Other: _____ |

Pathways: Where will people walk through the schoolyard habitat? You may not need to create pathways. However, they can make the site accessible, protect plants, and prevent soil compaction. If needed, what type of pathways will you create?

- Mowed path/lawn
- Mulch
- Hardscaping (pavers, gravel, brick, etc.)
- Other:
- Approximate square footage/area of new pathways _____

Storage: It's helpful to store tools, teaching materials, or protective equipment within the schoolyard habitat. Checkmark the storage options you would like to include:

- Small outdoor storage containers
- Shed
- Other: _____

Garden Structures: Depending on the size of the schoolyard habitat site, garden structures can protect classes from weather, enhance activities, or support plants. Building a structure can be a long-term goal to be completed at a later date, but it is helpful to plan where you'd like to build it during this design process. Checkmark the structures you would like to include:

- | | |
|---|--|
| <input type="radio"/> Pavilion or Pergola | <input type="radio"/> Greenhouse |
| <input type="radio"/> Gazebo | <input type="radio"/> Compost Bins |
| <input type="radio"/> Arbor | <input type="radio"/> Rainwater Catchment System |
| <input type="radio"/> Shade structure | <input type="radio"/> Other: _____ |

Additional Materials: The schoolyard habitat should be designed to reflect the needs and creativity of the school community. Are there additional items you would like to include in the schoolyard habitat? Keep in mind these can be added at a later date.

- Artwork (murals, mosaics, sculptures, etc.)
- Cooking Station
- Kiosk
- Little library box
- Nature play space
- Signs (interpretive signs, plant labels, QR codes, etc.)
- Washing station
- Other: _____

(continued)

2. Wildlife Habitat Planning

A National Wildlife Federation Schoolyard Habitats[®] garden should provide food, water, cover, and a place for wildlife to raise their young. Checkmark the features you **plan to add** to the schoolyard habitat.

Food: What sources of food will wildlife find in the schoolyard habitat? Checkmark all that will be included in your schoolyard\habitat. (Note, the next section, **“Plant Selection,”** will guide you in selecting specific plants for wildlife).

- | | |
|---|--|
| <input type="radio"/> Berries or fruit from trees or shrubs | <input type="radio"/> Sap |
| <input type="radio"/> Seeds from a plant | <input type="radio"/> Bird or hummingbird feeder |
| <input type="radio"/> Nectar/pollen from flowers | <input type="radio"/> Squirrel feeder |
| <input type="radio"/> Foliage and/or twigs | <input type="radio"/> Other |

Water: Your schoolyard habitat needs one of the following sources to provide clean water for wildlife to drink and bathe. Check all that will be included in the schoolyard habitat.

- | | |
|--|-------------------------------------|
| <input type="radio"/> Birdbath | <input type="radio"/> Stream |
| <input type="radio"/> Butterfly puddling dish/area | <input type="radio"/> Seasonal pool |
| <input type="radio"/> Rain garden | <input type="radio"/> Ocean |
| <input type="radio"/> Lake or pond | <input type="radio"/> River |

Cover: Wildlife need places to find shelter from weather and predators. Check all that will be included in the schoolyard habitat.

- | | |
|---|--|
| <input type="radio"/> Evergreen trees or shrubs | <input type="radio"/> Roosting box |
| <input type="radio"/> Dense shrubs or thicket | <input type="radio"/> Brush or log pile |
| <input type="radio"/> Wooded area | <input type="radio"/> Meadow or prairie |
| <input type="radio"/> Ground cover | <input type="radio"/> Water garden or pond |
| <input type="radio"/> Rock pile or wall | |

Place to Raise Young: Wildlife need places to give birth and raise their young. Check all that will be included in the schoolyard habitat.

- | | |
|---|--|
| <input type="radio"/> Mature trees | <input type="radio"/> Burrow |
| <input type="radio"/> Dense shrubs or thicket | <input type="radio"/> Dead trees or snags |
| <input type="radio"/> Meadow or prairie | <input type="radio"/> Bare patches of soil (for ground nesting bees) |
| <input type="radio"/> Nesting box | <input type="radio"/> Water garden or pond |
| <input type="radio"/> Woodland | |

(continued)

3. Sustainable Gardening Practices

Maintaining the schoolyard habitat in an environmentally friendly way helps ensure that the soil, air, and water that wildlife and people rely upon stay clean and healthy. What types of eco-friendly gardening practices will you use in the schoolyard habitat? Checkmark all that apply.

Soil and Water Conservation

- Capture rainwater from roof (rain barrel)
- Xeriscape (water-wise landscaping)
- Drip or soaker hose for irrigation
- Limit water use
- Reduce erosion
- Use mulch
- Rain garden

Controlling Exotic Species

- Remove non-native plants and animals
- Use native plants
- Reduce lawn areas
- Practice [Integrated Pest Management](#) (IPM)

Organic Practices

- We will not use chemical pesticides
- We will not use chemical fertilizers
- Compost

Planning the Installation Schedule

With a detailed site plan to create your schoolyard habitat in hand, you can now plan the installation process. Creating an outdoor classroom and planting a garden takes a lot of work. Dividing the work into phases, completed over time, can keep the project manageable, allow time to raise funds, and help build community support. This can be a multi-year process. Brainstorm the year ahead for your schoolyard habitat project in the table below.

Questions to consider: How will the habitat team get started? When will you order supplies or fundraise? What site preparations do you need to complete before you can start planting (like debris removal, asphalt breaking, and creating raised beds)? When will you break ground and begin planting? How and when will the habitat team recruit volunteers for various phases of the project?

Fall		Winter	
Task	Who will do it?	Task	Who will do it?
Spring		Summer	
Task	Who will do it?	Task	Who will do it?

GROWING

Self-sufficiency. Teamwork. Dexterity. Fruits. Technology. Habitat.



ENGAGE
the
community



CREATE
the
habitat team



ASSESS
the site



DESIGN
the habitat



BUILD
the habitat



DEVELOP
a maintenance
plan



CELEBRATE
success

Green
STEAM!

STEAM Curriculum Connections

Technology: Make videos to record the process. Social media, livestream videos to engage the community and volunteers.

Math: Measure wood/planting beds, calculate volume of soil.

Art: Design and create garden signage, interpretive & decorative signs, photography to record the process (before and after photos).

By now, your habitat team has chosen your schoolyard habitat site, carefully developed a garden design, drafted a detailed map, and charted a schedule for carrying out the installation process. You're ready to break ground and get planting!

Creating your schoolyard habitat will require more than one day for breaking ground and planting. Plan a minimum of two days of work (4-6 hours each day), even for a small area—one day for breaking ground and one day for planting. Give your plants the greatest chance of success by completing as much site preparation as possible before any planting begins.

Breaking Ground

Assemble Materials, Tools, and Volunteers. Be sure to order all the materials and tools you will need ahead

of time, and have them on site for ground-breaking day. Also, make sure you have enough volunteers (see Volunteer Recruitment Ideas and Strategies, Appendix E, page 76), plus food, water, shade, and a detailed task plan for volunteers to follow.

Since the method for site preparation is unique to each site, the information included here is general. You'll need to assess your particular situation, then seek information from regional gardening books, websites, local experts, or local garden centers. Try to



Photo: Mary K. Sullivan.



Photo: McKinley Elementary School.

Take plenty of photos of the site before breaking ground and planting days to show the progress of the project. This is an excellent way to engage more funders and volunteers.

have as many tools on hand as possible, and ask volunteers to bring their own gloves and appropriate garden tools. If available, consider having tents on site to provide shade, placed strategically in different work areas.

Planting Your Habitat

Once you have carefully prepared the site and soil, you're ready to start planting!

Planting Day(s)

Planting days are a great opportunity to involve the whole school community, especially students and community members who have not yet taken part. Those involved in building and planting the garden space are more likely to care for it and support future phases of the project. Planting days take organization and planning to ensure students, teachers, and volunteers all have an assigned role and know what they are supposed to do. Consider the following tasks when planning your planting events.

Checklist for Breaking Ground Day(s)

Before Work Begins

- Have all volunteers sign the **Volunteer Application & Waiver form** and the photo release form before starting to work.
- Check that any participating students have a photo release form signed by a parent or guardian.
- Create a **list of tasks and responsibilities** to assign volunteers as they sign in.
- Stones, tree stumps, edging material, etc. have been delivered and placed near the chosen site.
- Structures like benches, tables, etc. have been delivered and placed close to the chosen site.
- Set up tents for shade if needed.
Print copies of the **Volunteer Sign-in Sheet** (see Appendix F, page 78).
- Set up water and snack food stations. Have sunscreen, mosquito repellent, and a first aid kit available.
- Assemble necessary garden tools, like gloves, wheelbarrows, pick axes, pitch forks, hoes, shovels. You may need a tree saw and/or pruning shears to cut vines, branches, or saplings.
- Have a hand truck (dolly) on site to move large structures: benches, tables, etc.

During the work day

Note: Remind volunteers to hydrate and take appropriate rest breaks.

- Demonstrate basic use of gardening tools.
- Demonstrate basic safety precautions.
- Remove grass, debris, invasive or exotic plants, and unwanted man-made structures from site (see Appendix G, page 79).
- Prune branches, vines, and saplings as needed.
- Mark pathways using string, stakes, and mallet.
- Mark where structures like benches, tables, stones, etc. will be installed.
- Turn soil and add organic matter (compost) if needed.
- Install edging material as noted in site design to delineate garden borders.
- Install large structures like stones, benches, tables, pond, etc.

Note: Avoid planning a planting day on a Friday if possible—if the event is rained out, plants may not survive until Monday.

Before Work Begins:

- Create a checklist of all the materials you will need to have available on planting day, including gloves, trowels, shovels, wheelbarrows, hoses, watering cans, mulch, plants, soil, compost, plant markers (available at nurseries and garden centers), and organic fertilizer.
- Review the site design plan and planting techniques with volunteers. (See *Detailed Planting Guide*, Appendix H, page 80) This is critical to the success of the planting project. Remind volunteers they are creating permanent homes for plants and need to give them the best start possible.
- Clarify which plants go where.
- Review and demonstrate how to prepare the soil for planting: turn soil, add topsoil and, if needed, add compost/humus/fertilizer before planting.
- Review general planting instructions (hole size, watering, mulching, etc.) and demonstrate correct planting techniques.
- Review tool and safety issues with volunteers as needed.
- Put adults and older students in charge of digging the bigger holes for trees and shrubs. Involve younger students in digging holes for smaller plants.
- Divide students and volunteers into groups, assigning each group a certain area of the habitat to plant. If possible, assign a habitat team member to assist each group. Give the students area- and plant-specific instructions, including how far apart plants should be spaced.
- Have students label plant markers in permanent ink. Place in appropriate spots throughout the habitat to identify plants and educate visitors.
- After planting, water generously. Remember to have a plan for frequent watering during the first three months, while plants get established.
- If you have enough funds, host a pizza party to end the planting day! Or engage volunteers to coordinate a potluck to share a meal after the work is done.

Volunteer Recruitment and Engagement

Installing a schoolyard habitat takes a lot of physical work and on-going effort and care. Volunteers are critical to the success of your

project. Students and their families are your main volunteer source. Send a letter to the school community about the plans to install the schoolyard habitat garden (you'll find a **template letter** on Appendix I, page 81, to get you started). You may also find the **Volunteer Interest Survey form** (Appendix J, page 82) helpful for recruiting volunteers.

Make sure all volunteers follow school-based guidelines for volunteers. Photos and short videos of your schoolyard habitat events are key to spreading the word about your project, motivating more community participation, and developing compelling fundraising appeals.

Also, make sure all volunteers sign a **photo release form** (a parent or guardian needs to sign the form for students under age 18). Your school should have a photo release form you can use.

Ways to Find and Engage Volunteers

Parents, guardians, grandparents, neighbors

- Keep track of newly enrolled students and reach out to their families. Start early—be sure to engage the Pre-K and Kindergarten parents!
- Provide materials in the languages families speak, and have translators available when hosting an information session.
- Offer a mix of volunteer roles, including behind-the-scenes jobs.
- Create a clear and simple way to sign up for volunteering, and share this process at the start of the school year. For example, create an online *Volunteer Interest Survey* (described above) and

include the link in a back-to-school welcome email to the entire school community.

- Coordinate a ride-share so parents and families without transportation can volunteer.

Other Sources of Volunteers

- Master Gardeners (volunteers trained in horticulture by local Cooperative Extension offices)
- Retirees
- Civic organizations (i.e., Lions Club, Garden Clubs, etc.)
- Boy Scouts, Girl Scouts, Eagle scouts, and similar groups
- Local colleges and universities, specifically agriculture extensions departments
- Local businesses, like supermarket or super center chains (they frequently look for community projects for their employees)
- High school students who need to complete community service hours for graduation
- Social media: Twitter, Instagram, Facebook
- Post your event on volunteer recruiting platforms like [Volunteer Match](#).

Last but Not Least... Show your appreciation!

Be sure to acknowledge your volunteers, and let them know how much you appreciate them. After the event, put pictures of volunteers on bulletin boards. Thank them in the school newsletter, host a special event for them, or send them thank-you cards. Encourage students and the habitat team to think of creative ways to express their gratitude.



GROWING

Enthusiasm. Commitment. Problem-solving. Physical Fitness. Habitat.



ENGAGE
the
community



CREATE
the
habitat team



ASSESS
the site



DESIGN
the habitat



BUILD
the habitat



MAINTAIN
your habitat



CELEBRATE
success

Nurturing Long-term Success

Your National Wildlife Federation Schoolyard Habitats® garden will only be as successful as its long-term care. Develop a clear, detailed maintenance strategy to ensure your schoolyard habitat remains beautiful, productive, and useful over time. Though you have developed your site with native plants, you'll still need to water, weed, mulch, and tend the habitat throughout the year, including summer break. Although maintenance staff should be fully engaged and aware of your program, they usually are not responsible for this ongoing maintenance.

The habitat team should develop a maintenance strategy for the school year, summer months, and long holidays. Many schools devise a schedule for students, parents, and community volunteers to help maintain the schoolyard habitat (see example on page 65). Summer maintenance is critical, so be sure to have summer help in place. If your school has a summer school program, consider engaging teachers and staff to involve their students. Sometimes administrative and office staff are willing to

participate as well, especially if the habitat includes vegetables they can harvest during the summer. Engage families and volunteers by posting sign-ups (or use digital sign-up apps) to take care of the habitat for a specific period of time.

Make sure those who have agreed to help maintain the site have been trained and understand what they need to do to keep the garden healthy and vibrant. Summertime can pose special challenges.

For those responsible for habitat maintenance during the summer, make sure they:

- Know where to find and access supplies, equipment and water.
- Know the boundaries of the planting area so it will not be mowed.
- Can identify which plants are part of the habitat and which are weeds to be removed.
- Can identify insect pests (such as aphids) and know non-toxic methods to remove and deter them.
- Can identify beneficial insects such as ladybird beetles (a.k.a. ladybugs), butterflies, and earthworms.
- Have the number of a contact person to call if there are problems with the habitat.



Photo: Holly Gallagher.

The habitat team can create a list of maintenance tasks for the year ahead. To begin, brainstorm activities (like planting, student activities, and specific maintenance) that should be conducted in each of the four seasons. This should be a working document that can be refined over time.

To help you get started, you'll find an example of a seasonal maintenance worksheet (right), and a blank maintenance worksheet on page 66. You can brainstorm tasks to maintain your schoolyard habitat as a classroom activity, or among habitat team members.

Spring

- Check soil conditions composition, pH, nutrients (nitrogen, potassium, phosphorus).
- Organize cleanup and planting days:
 - remove mulch and cover crops
 - plant trees and container plants
- Monitor monarch migration with students.
- Hold fundraiser (students' art sale, plant sale).
- Celebrate Earth Day.
- Create summer maintenance plan; delegate maintenance responsibilities.

Summer

- Water plants according to the weather.
- Turn and water the compost pile once a week.
- Weed and fertilize beds (with compost).
- Harvest and distribute any vegetables.
- Add dead leaves and flowers to compost.
- Reach out to the community to find funders and expertise.
- Host staff learning sessions about teaching with the schoolyard habitats site.

Fall

- Divide and replant perennials.
- Plant fall flowering bulbs.
- Harvest vegetables for a Thanksgiving celebration.
- Bring container plants inside or protect with mulch or other coverings.
- Compost plants killed by frost.
- Plant cover crops and mulch young trees.
- Clean up habitat.
- Clean, sharpen, and store all garden tools.

Winter

- Map next year's garden.
- Plan spring projects.
- Start seeds in the classroom.
- Make labels and signs for habitat.
- Check that the mulch hasn't been disturbed.
- Maintain the compost pile weekly.
- Write plans for integrating habitat into curriculum and across disciplines.
- Build bat and bird boxes with students.
- Make plans to feed and provide fresh water for the native and migrating birds.

Seasonal Maintenance Tasks

Directions: Brainstorm the seasonal maintenance tasks needed to keep your National Wildlife Federation Schoolyard Habitats® garden healthy, beautiful, and productive during the coming year.

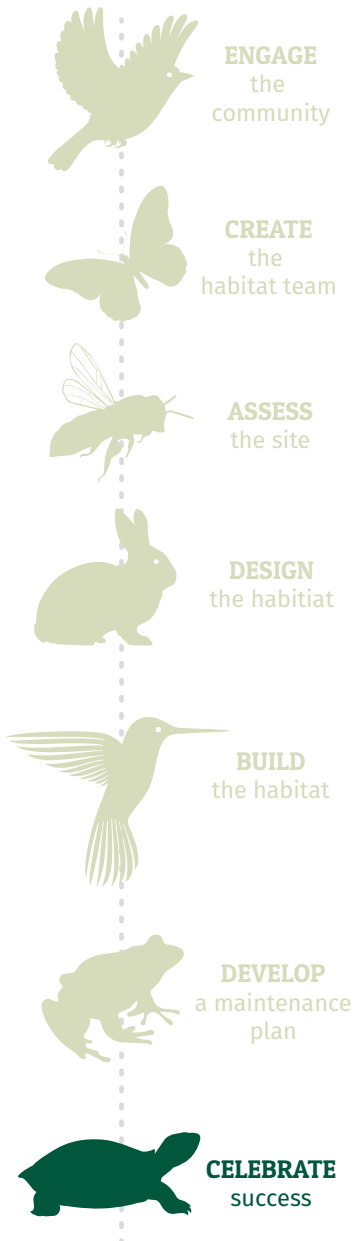
<p style="text-align: center;">Spring</p>	<p style="text-align: center;">Summer</p>
<p style="text-align: center;">Fall</p>	<p style="text-align: center;">Winter</p>



Photo: Maria Elena Garcia.

GROWING

Joy. Life Skills. Interdependence. Nature-based Careers. Healthy Soil. Habitat.



You did it!

Native wildflowers, shrubs, and saplings enliven a portion of the schoolyard that had been hard-packed dirt and asphalt not long ago. A monarch butterfly sips nectar from a wild aster. Wild bees probe bright goldenrod flowers. A chickadee plucks a seed from a ripe sunflower head, then flies to the shelter of a newly planted apple tree to eat it. Nearby, students cluster around a raised bed, magnifying glasses in hand, studying leaf structure.

After months of planning and effort, your schoolyard habitat has taken root. It's time to celebrate! Celebrating is an important part of the schoolyard habitat project, allowing you to publicly recognize the people who helped create the habitat. Celebration is a powerful motivator, inspiring current volunteers to continue their efforts, and inviting new participation.

Certification and Awards

Your new schoolyard habitat joins a vibrant network nationwide. The National Wildlife Federation offers two different ways to celebrate and officially recognize this achievement: National Wildlife Federation Schoolyard Habitats[®] Certification and National Wildlife Federation's Eco-Schools USA.

Certify your Schoolyard Habitat

Almost 10,000 schools have certified their Schoolyard Habitats[®] site with the National Wildlife Federation. When you certify your habitat, your school receives a Certificate of Achievement from the National Wildlife Federation. Metal signage is available for purchase and is another opportunity to announce the school's certification to the community. When ready to certify your schoolyard habitat, just complete the free [online application](#).

Apply for Awards under the National Wildlife Federation Eco-Schools USA Program

Eco-Schools awards celebrate major milestones on the journey to becoming a more sustainable school. These awards showcase your school's commitment to sustainability. They amplify the importance of the schoolyard habitat project, both within the school and in the broader community.

Remember that your schoolyard habitat is a dynamic and evolving project and process. You have created an exciting outdoor learning classroom that can serve your school community and provide application-based, place-based, and phenomena-based learning opportunities for your students for decades to come!

By participating in the **Eco-Schools USA Schoolyard Habitats®** pathway, your school will be eligible to apply for a bronze award. Go to [Eco-Schools USA Awards](#) to find out more.

Remember that your schoolyard habitat is a dynamic and evolving project and process. You have created an exciting outdoor learning classroom that can serve your school community and provide application-based, place-based, and phenomena-based learning opportunities for your students for decades to come. Check out Appendix K, (page 84) and Appendix L, (page 88) for additional schoolyard habitat resources that can support teaching and learning in your schoolyard habitat.

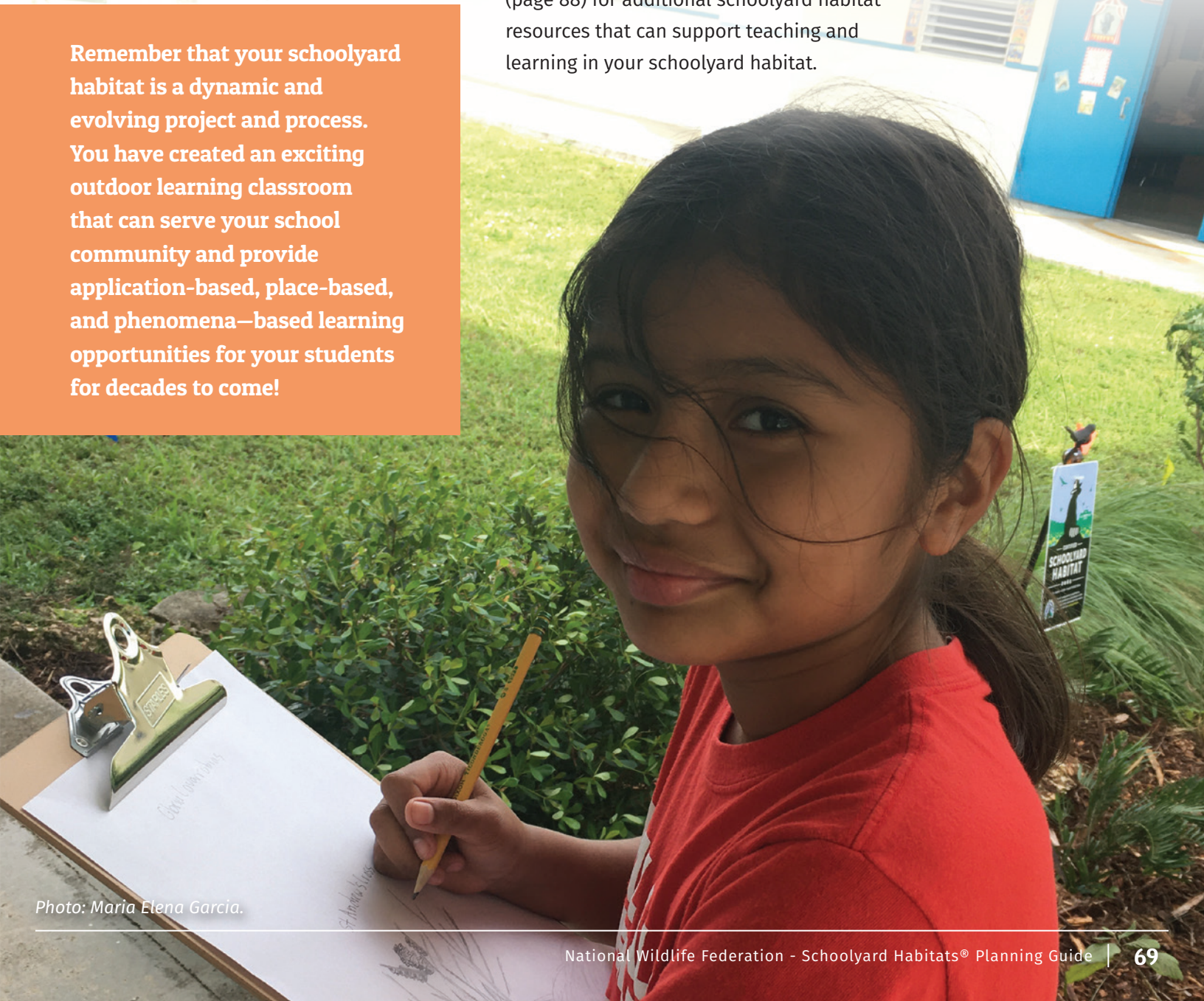


Photo: Maria Elena Garcia.

Pacing, Baseline Mapping, and Mapping to Scale

There are many ways to approach mapping the schoolyard and taking site inventories. For some teachers, mapping may be an entire unit that culminates in making a scale model of the schoolyard. Others choose to do rough estimates of schoolyard dimensions, spending more time on assessing the characteristics of the site. The following information will help as you decide on your own approach to schoolyard assessment.

Pacing

Pacing is one method students can use to determine the dimensions of your National Wildlife Federation Schoolyard Habitats® site and make measurements when creating baseline maps. This method gives students a chance to practice practical math skills such as calculating averages and measurement conversions. For more accurate measurements, use 50-100 ft measuring tapes instead of pacing when mapping the site.

1. Establish a starting point.
2. Measure a 100-foot straight line from that point.
3. Begin with your left foot and count the number of paces it takes you to walk 100 feet. Count every time your right foot hits the ground. 1 pace = 2 steps (one left, one right)
4. Pace this distance several times, then calculate the average number of paces you take to walk this distance.
5. Divide 100 by the average number of paces you take to walk 100 feet. This is the length of your pace. You can use this distance to determine an approximate measurement of the site you are inventorying by pacing the distance for each side of the inventory area.

Baseline Mapping

A baseline is a fixed line from which all measurements are made.

1. To create a baseline inventory map for a schoolyard habitat project, students should first make a hand sketch map of the site they will be inventorying on an 8 1/2" x 11" sheet of paper.
2. Determine the dimensions of the site; mark each side of the sketched area accordingly.
3. Conduct an inventory of the site and sketch or write the name of key inventory elements in their approximate location on the map.
4. Use one edge of the inventory site as the baseline.
5. Place a measuring tape along this edge (or if pacing, use string to establish a visible, straight line).
6. Measure the distance from the baseline to each of the key inventory elements that have been sketched on the map. To do this correctly, measurements should always be made at right angles to the baseline.
7. Use a second string (or measuring tape) to create a perpendicular "line" from the baseline to the element. Measure this distance and write it on the map next to the item.
8. Repeat for all elements on the map. Make sure to demonstrate this process before having students try it.

(continued)

Mapping to Scale

Determine a scale for your map that will fit onto the graph paper being used. The scale should be large enough that the habitat site takes up most of the page.

1. Transfer the rough sketch of the area from the sketch map onto the graph paper, indicating correct dimensions and shape. Be sure to include a compass rose.
2. Using tracing paper, create overlays of the inventory elements. Use a separate sheet of tracing paper or overhead transparency for each type of inventory element and a different colored marker (marker ink shows through the layers better than crayon). To do this, place a single overlay sheet on top of the graphed base map.

Plot the locations of one element (i.e., traffic flow) according to the established scale. Remove the overlay and repeat for each type of inventory element.

Mapping Applications

There are many technology resources and online mapping applications such as Google Maps, Google Earth, or a municipal or school district GIS repository that can be used to view or print a current, accurate, and detailed aerial photo of your school.

Google Maps

1. In the search area, type your school's name or address and press enter.
2. Select "Satellite" option on the bottom of the map.
3. Use the plus sign to zoom in a little closer to your school and see the building entrances, perimeter, landscapes, and other features of the school grounds.
4. Take note of the scale on the bottom right corner of the map.
5. To measure distances, right click and select "measure distance." Click on the map to trace the area to measure.
6. From here, you can project the map for the class to view and discuss the sections of the school grounds or print copies and ask students to label them or use them to draw a base map.

Appendix B: Who Can Live Here Animal Cards

Chipmunk



The eastern chipmunk is found in deciduous forests, shrub habitat, forest edges, and suburban and urban areas where there is a lot of cover to protect it from predators.

Chipmunks are omnivores (they feed on both plants and animals). Their diet includes seeds, nuts, berries, fruits, flowers, mushrooms, insects, worms, snails, frogs, bird eggs, and small birds.

They are most active in the early morning and late afternoon. Although they climb trees, they spend most of their lives on the ground or underground in burrows.

Monarch Butterfly



Monarchs are native to North and South America. Photo: Carolyn Souder.

These butterflies use different habitat in the warm months versus the cold months. They cannot survive freezing temperatures, so they over-winter in the cool high mountains of central Mexico and woodlands in central and southern California. In the spring, summer and fall they can be found wherever there are milkweed plants. They are always searching for milkweed and suitable nectar plants.

These butterflies are like all butterflies, they change their diet as they develop. During the caterpillar stage they live only on milkweed plants. Adult monarchs feed on nectar from a wide range of flowers. All the monarch butterfly's water needs are met through nectar feeding.

Common Musk Turtle



The common musk turtle is also known as a "stinkpot" because when it is captured or disturbed it secretes a smelly fluid from its top shell.

This is a small turtle, about 3-5 inches, with tan, brown, and gray or black top shell that may have dark flecks and be coated with algae. These are aquatic turtles who love rivers, streams, and reservoirs. Shallow, slow-moving streams and rivers with muddy bottoms and dense vegetation are preferred. Musk turtles are less common in ponds and lakes.

The diet of the musk turtle includes freshwater mussels, snails, crayfish, aquatic insects, worms, small fish, tadpoles, carrion, and aquatic plants.

Wild Turkey



Photo: Dennis Morrison.

Wild turkeys are very large birds native to North America. They have long legs and a slim neck. The wild turkey's dark feathers have shades of red, green and copper that shine when hit by the sun. Wild turkeys can fly and run at incredible speeds. They reach up to 55 mph flying and 25 mph running.

Turkeys travel together in flocks. They search on the ground for nuts, berries, insects, and snails to eat. Acorns (nuts from oak trees) are a key food source for wild turkeys. They use their feet to scratch leaf litter when searching for food.

At night, turkeys fly up into trees to roost in groups. They make nests on the ground, often in tall grass or under shrubs.

Pennsylvania Leatherwind Beetle



This beetle is the most common of the Goldenrod Soldier Beetle family. Both the adults and larvae have the ability to produce defensive chemicals from their abdomens.

Commonly seen in groups in late summer and early fall on goldenrod flowers, where it feeds on nectar, pollen, and insects. The beetle has a big appetite for aphids, so they are great to have in the garden—FREE organic pest control!

They can be found in meadows, fencerows, gardens, and other areas with thick, sunlit vegetation.

Safety in the Schoolyard Habitat

Safety procedures should be incorporated into any outdoor activities in the schoolyard habitat. To ensure everyone's safety, set clear expectations and rules for outdoor procedures and behavior.

- Know and follow your school's plans for emergency procedures.
- Follow your school's existing safety and hand-washing procedures for entering and exiting the school building.
- Be aware of any allergies, medications, and special precautions necessary for the safe involvement of all students.
- If poison ivy, poison sumac, or poison oak grow in your area, teach students to recognize, identify, and avoid contact with these plants.
- If participants explore an area by turning over rocks or logs, make sure they do so carefully. In areas where poisonous snakes may live, students and leaders should always turn rocks and logs over toward themselves, grasping the edge of the rock or log farthest from them. That way any alarmed creatures can escape in the opposite direction. Return rocks or logs to their previous positions when you are finished looking.
- Encourage calmness if bees or wasps approach. Usually, when bees and wasps find out that the sweet-smelling person they landed on is not a flower, they will move on. If people swat at them, they may attack.
- Encourage long pants in areas where deer ticks are abundant.

Soil Safety

Lead and Contaminants in Soil: Soil can hold heavy metals harmful to human health, like arsenic, barium, cadmium, chromium, lead, and nickel.

Lead is a common soil contaminant that is often found in urban settings, particularly near heavily trafficked roads, former industrial sites, and peeling paint. Lead can be ingested or inhaled through direct contact with soil, as well as from soil that is tracked inside or blown in as dust. Young children who tend to put things in their mouth are most at risk. There is no easy fix for remediating contaminated soil. Covering the affected area with at least six inches of clean topsoil, compost, and mulch is an effective way to reduce risk of exposure. Test the soil if students will spend time digging in the soil or if you plan to grow food crops in existing soil of the schoolyard habitat. Soil samples can be sent to soil testing labs at regional universities or extension services.

Here are additional tips to minimize exposure to contaminated soils:

- Wear gloves while gardening and interacting with soil.
- Wash hands after gardening and playing in the soil.
- Avoid play on bare patches of soil or near painted walls or fences.
- Wash your harvest and peel root vegetables.
- Mulch garden paths.
- Leave dirty things outside (gardening tools, sports gear, etc.).
- Grow only in soil you know is safe.

For additional information, please visit:

- Cornell University Healthy Soils, Healthy Communities: blogs.cornell.edu/healthysouils/
- Centers for Disease Control and Prevention: www.cdc.gov/nceh/lead/prevention/sources/soil.htm

National Wildlife Federation Schoolyard Habitats® Accessibility Guidelines

When creating a schoolyard habitat, be sure to consider the needs of people as well as wildlife, including people with disabilities. When possible, add accessible elements to the habitat design that will enhance the usability of the space for people with diverse abilities, senior citizens, and parents with strollers. Of course, the size and location of the habitat area and the project budget will help determine the accessible elements you can include. The following suggestions are low-cost and easily implemented. If you can't include these in your initial design, consider adding more accessible elements into the long-range habitat plan.

Note: If the habitat site is developed at a public or government facility or the project funding comes from federal, state or local government sources, the site must meet accessibility requirements detailed in the Americans With Disabilities Act. Please contact the United States Access Board at www.accessboard.gov for additional accessibility guidelines.

Location

- Choose a site that is inherently accessible (i.e., level, easy to get to, does not flood, etc.).
- Place the habitat close to a building. Take advantage of existing paths or sidewalks for access.
- Choose a site that is close to a water source for easy maintenance.

Pathways

- **Width:** Optimal recommended width is 60 inches with a minimum recommended width of 48 inches.
- **Surface:** Should be firm and stable. Recommended surface options include pavement, textured concrete, and screenings. Screenings are made from a mixture of small pieces of rock (no greater than 1/4 inch in size; typically limestone or greenstone) and dust for stabilization. Brick and boardwalk-style pathways become slick when wet and can be a safety risk. Rock, wood chip, and stepping stone paths are not recommended.
- **Slope:** Recommended 5% or less running slope (grade). Recommended cross slope is 2 to 3%.
- **Ramps:** Any time the grade of a path exceeds 5%, provide a ramp. If a ramp is needed, the least amount of slope possible is recommended. A maximum acceptable slope is 1:12 (e.g., a one-inch rise for every twelve inches of distance). Ramps are required to have a level, 60-inch minimum landing immediately before and after a sloped run, and a landing must be installed for every 30 feet of sloped run.
- **Handrails:** The gripping surface of handrails should be between 1 1/4 and 1 1/2 inches wide. Recommended handrail heights for adults should be 34 to 38 inches; heights for children should be 20 to 27 inches.
- **Obstacles:** Paths should be free of any obstacles such as roots, rocks, and/or steps. There should be ample head and side clearance (i.e. from tree branches) for individuals at standing and seated levels. It is important to maintain pathways for safety.

Planting Beds and Containers

- Create raised planting beds or boxes to accommodate individuals in wheelchairs, senior citizens, and other individuals with limited mobility. If possible use a mixture of heights to accommodate the greatest range of individuals.

(continued)

- Create a sensory garden (in which visitors can smell, touch, and hear nature) in a raised bed or standing planter box for individuals with visual impairments.
- Use trellises to raise plants vertically to make them accessible from varied heights.
- Containers are an inexpensive way to create raised plantings. Whiskey barrels and other large planters are excellent heights for wheelchair access. You can also use plant stands and existing walls to place containers at different heights.
- If possible, use a multi-layered landscape design to increase access to all individuals.

Tools

- Have adaptive gardening tools on hand, including long-handled tools, tools with adaptive handles, and lightweight, and comfort-grip tools. The handles of traditional gardening tools can also be modified with tape, foam, or bandage material for gardeners with limited muscle strength, coordination, or dexterity.
- Provide an apron with pockets for gardeners who have difficulty carrying things, or secure a lightweight bag or basket on their wheelchair or walker.
- If possible, provide a tool storage shed in or near the habitat.
- To increase comfort, provide kneelers, knee pads, or a small stool for gardeners who have difficulty bending or squatting.
- Use tools with brightly colored handles or paint or tape the handles white to make them visible for gardeners with poor vision.

Signage

- Interpretive signs should use simple, clear, engaging language. Text font should be large enough to read easily. When possible, use pictures and/or graphics to tell your story.
- Make Braille plant labels for raised bed sensory gardens.

Miscellaneous

- Add benches for people to rest. Consider having back supports and an armrest on at least one end. If possible, place benches in shade. Recommended spacing between benches is 100 feet or less, depending on the size of the habitat.
- Choose plants for scent and tactile recognition for gardeners and visitors with visual impairments.
- Use sound-producing elements such as wind chimes, a waterfall, or a fountain to help provide orientation in the habitat for gardeners and visitors with visual impairments.

Appendix E: Volunteer Recruitment and Engagement

The school's first source of volunteers is the students' parents and families. Please refer to the **template letter** to announce to the school community about the plans to design and install a National Wildlife Federation Schoolyard Habitats® garden as an outdoor classroom to enrich student learning. Consider using this other tool, the **Volunteer Interest Survey form**, to recruit and assess

the interests of volunteers. No matter how you choose to assess and identify volunteers, engaging these community assets will be enormously helpful in achieving the full potential of your schoolyard habitat project.



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Installing a schoolyard habitat garden requires a lot of physical work and it involves a lot of lifting and handling gardening tools, please make sure all volunteers sign the **volunteer waiver form**. Taking photos and short videos of the different schoolyard habitat events are important for motivating more community participation and for fundraising purposes. Make sure all volunteers and students' parents sign a **photo release form** or you can use the school's photo release form.

Here are some ideas on how to find and engage volunteers:

• Parents, guardians, grandparents, neighbors:

- Keep track of newly enrolled students and reach out to their families. Engage the Pre-K/Kindergarten parents!
- Give shy or low-key parents behind-the-scenes jobs.
- Set up a clear and simple way to sign up, and share this process at the start of the school year. For example, include an online form, **Volunteer Interest Survey**, in a back-to-school welcome email to the entire school community.
- Coordinate a ride-share so parents and families that do not have transportation can volunteer.

• Other sources of volunteers:

- Master Gardeners (volunteers trained in horticulture by local Cooperative Extension offices)
- Retirees
- Civic organizations (i.e., Lions Club, Garden Clubs, etc.)
- Boys Scouts, Girl Scouts, Eagle scouts, and similar groups
- Local colleges and universities, specifically agriculture extensions departments
- Local business, like supermarket or super center chains. They are always looking for community projects to engage their employers
- High school students who need to complete community hours required for graduation

Appendix E: Volunteer Recruitment and Engagement

(continued)

- Social media: Twitter, Instagram, Facebook
- Post your event on volunteer recruiting platforms, like **Volunteer Match**

- **Show your appreciation:**

- Acknowledge and appreciate your volunteers. After the event, put pictures of volunteers on bulletin boards. Thank them in the parent newsletter that everyone will read. For more volunteer appreciation ideas, visit <https://www.ptotoday.com/campaign/request/volgide/thanks>



**SCHOOLYARD
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Volunteer Sign-in Sheet: Breaking Ground & Planting Days

Date:

School:

Coordinator:



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	Name	Email	Role (parent, teacher, community member, etc)	Signature
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

Lawn Removal Techniques

For this common and usually daunting task, here are some options for lawn grass removal:

1. Cardboard and newspaper. One option is to lay down cardboard or sheets of newspaper on the plot and cover it with at least 3” of mulch. This not only kills the grass; it makes good, rich soil. Starting this process in the fall gives the cardboard and mulch time to degrade. Planting should begin only after the cardboard has degraded enough for roots to maneuver through; this could take several months.

2. Solarization. Mark the area for plant removal with surveyor chalk (pathways, bed areas). Soak the area. This creates a hotter temperature underneath the plastic. Place clear 6 ml plastic over the area (clear plastic will cause higher temperatures than black). This works best when the area is in full sun. Use landscape staples or heavy rocks to seal the plastic to the ground. Place the staples or rocks approximately one foot apart. Wait three weeks. The ideal outdoor temperature is 80 degrees or greater, and the grass should be actively growing. Remove the plastic. Dig up weeds and grass. Use a hoe, shovel, or very shallow tiller (soil should not be disturbed more than 3” below the surface). Certain grasses and weeds (such as Bermuda grass) thrive on disturbance! Soak the area again. Repeat the process.

3. Sod-cutter. A sod-cutter will cut the sod into strips, which can be rolled up, removed, and saved for compost. An experienced adult should run this machine. Sod-cutters are available for rental at local equipment rental centers. A group with a small plot and a lot of muscle power can cut and pry out sod with a sharp, flat bladed shovel. Cut small squares, about 1 1/2 inches deep, and pry out the pieces of sod. Set the squares aside and use them later for compost. Note, however, that lawn grass is hardy stuff; it will grow back (even upside-down!) given the chance. A few weeks under a plastic tarp in warm weather should kill it and make decent compost. Once sod and any invasive plants are removed, where necessary cut roots and break apart tough soil with a hand mattock. Generally, it is not necessary to totally till the soil. In most areas the plants will do fine if the soil is loosened enough for roots to spread. The depth of soil to loosen depends on the needs of different plants.

Planting Techniques

Plants and Shrubs

Dig a hole the same depth and slightly wider than the plant's container. Remove the plant from its container and gently loosen the roots. Place in the hole and cover with backfill (soil from the hole).

Gently pat down the soil to be sure there are no large air pockets, water, and apply mulch.

Trees

Dig a hole twice as wide and no deeper than the tree's container or the height of its rootball. Remove the tree from its container or burlap wrap. Gently loosen the roots and place in the hole. Water for several minutes. Fill in the hole with backfill, pat down the soil, and apply mulch. Be careful not to pile mulch around the tree trunk, as this traps heat and moisture and can cause the bark to rot. Use a tree protector (available at nurseries or through gardening catalogs) when planting seedlings. This will protect small trees from errant lawn mowers and hungry deer.

Bulbs and Seeds

Refer to planting directions on packaging, water, and mulch. If desired, start seeds several weeks in advance as an additional activity for participants.

Soil

If the soil is in poor condition in the area, mix some organic material such as compost in with the backfill. Be sure to match plant needs with soil conditions. Adding soil amendments can slightly alter the soil quality, but the basic needs of a plant must be met by the existing soil for the plant to thrive.

Watering

Apply water generously, making sure to reach the roots and not just the surface. After the initial planting, water approximately once a week with one-inch of water, although amount will vary with weather conditions and soil type. If possible, water with a soaker hose or other drip irrigation system. Native plants will require watering periodically for a full growing season to help them become fully established. Once established, they should not require watering except in times of extreme drought.

Mulching

Apply at least a one-inch layer of mulch to the soil surface. There are a variety of mulches available including wood chip, leaf, and pine needle. Use what is readily available and fits the project budget. Mulch looks attractive and helps hold in moisture, adds nutrients, and helps cut down on weed growth.

Parents: Help your school create a Schoolyard Habitat Garden!



Our school is creating a National Wildlife Federation Schoolyard Habitats® site to provide habitat for wildlife on our grounds and to provide an outdoor classroom for the entire school community to learn in and enjoy. A schoolyard habitat in our school grounds will not only inspire learning among students, teachers, and the community, but will become an important part of our local ecosystem, providing essential habitat for wildlife. These living laboratories are a valuable teaching tool and are a great opportunity for students to fully engage in learning through hands-on, project-based learning, resulting in increased student comprehension and academic performance.

As part of the program, _____ Elementary will create a Habitat Team composed of students from to ____ grades. The Team will meet every other _____ from _____ to _____ in Room _____. The group will be led by _____ (teacher, parent, etc.) The Team will be responsible for organizing, coordinating, fundraising, designing, and installing the schoolyard habitat garden in our school grounds.

If your child is interested in being part of the Team, please have them sign in with _____ or at the main office. The Team will meet for the first time on _____ at _____ in room # _____. In addition, if you and/or a family member are interested in volunteering with the Team to help us create our schoolyard habitat garden, please let us know and join us during our meetings! We really need your input and support!

Thank you very much!

Habitat Team Leader

Principal

School name

Schoolyard Habitat Volunteer Interest Survey



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_____ is developing a National Wildlife Federation Schoolyard Habitats® site to provide habitat for wildlife on our grounds and to provide an outdoor classroom for the entire school community to learn in and enjoy. We are looking for volunteers to share their expertise, talent, experience, and interest in creating, enhancing, and/or maintaining our schoolyard habitats. Opportunities are endless, and range from one-time tree planting events to ongoing maintenance and assisting with teacher-led classes outside on the schoolyard. Please take a few moments to complete this form so that we can match you with a project that meets both your interests and our current needs. Thank you for your time and interest!

I am interested in volunteering to make a difference:

Fundraising:

- Write donation letters to community businesses for donations
- Organize plant sale
- Create Adopt-A-Brick or Adopt-A-Tile campaign
- Apply for grants and awards
- Other:

Communication:

- Handle communications with volunteers
- Contact local organizations for garden technical support: (local master gardeners' chapter, local botanists, etc.)
- Other:

Help from Home:

- Make phone calls
- Handle emails
- Create and maintain garden newsletter or blog (with student involvement)
- Make items for bake sale
- Help recruit community volunteers
- Other:

Outdoor classroom assistance:

- Assist with lessons in the garden
- Make materials
- Create and maintain garden bulletin board (with student involvement)
- Read to students in the garden
- Tutor in the garden
- Garden art and signage
- Other:

(continued)

Special events:

- Bake sale
- Garden design (experience in landscaping design)
- Help coordinate SYH Breaking Ground and Planting days
- Garden maintenance: summer, spring, fall, or winter (chose one)
- Other:



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I will be an event chair:

- Fundraising events
- Breaking Ground and Planting Days
- Garden community event organizer: Plant sales, elder/student learning sessions, garden tours by specialists for the community

I will be a team leader:

- Garden (year-round maintenance)
- Fundraising
- Volunteer coordinator

I can donate a needed item: Strapped for time? Consider making a monetary donation or donate a needed item for the schoolyard habitat garden, e.g. outdoor whiteboards, benches, picnic tables/umbrellas, garden tools, clipboards, magnifying glasses, soil and water testing kits, etc. Ask the lead garden teacher for a list of needed items.

I can donate: _____

I have a unique talent or skill that I'd like to share: (photographer, artist, graphic designer, botanist, landscape architect, bird watcher, etc.): _____

I have access to a unique resource that might be a great fit for the school: e.g. contact with district's school board, municipality, local business, universities, environmental organizations, etc. _____

The days, times and types of activities best for me are: (Please check all that apply)

- The School Day At School Weekday Evenings After School From Home Weekends

There are many opportunities for service at our schoolyard habitat. Come work with us to find the one that best fits you!

Your name: _____

Child's Name: _____

E-mail: _____

Child's Name: _____

Phone: Day Evening Check best time to contact you.

- Sign me up for the Schoolyard Habitat monthly newsletter/blog
- I am already signed up for the page.
- No thanks, I'd prefer not to receive the newsletter/blog

Habitat Planning Resources

NWF Garden for Wildlife Tipsheets

- **Attracting Butterflies**

www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Attracting_Butterflies_tipsheet

(Spanish) www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Tip-Sheets/Butterflies_Spanish

- **Birdfeeders**

www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Tip-Sheets/Bird-Feeders

- **Create a Bird-Friendly Habitat**

www.nwf.org/-/media/PDFs/Garden-for-Wildlife/Gardening-Tips/Bird-Friendly_web

- **How to Design a Better Wildlife Garden**

www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Ecological-Landscape-fact-sheet

- **How to Provide Water in Butterfly Gardens**

www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Tip-Sheets/Water-Butterfly-Gardens

- **Pollinator Gardening**

www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Tip-Sheets/Pollinator-Gardening

(Spanish) www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Tip-Sheets/Pollinator-Gardening_Spanish

NWF Early Childhood Health Outdoors (ECHO) How-To Guides

www.nwf.org/ECHO/Resources

- **Arbors**

www.nwf.org/-/media/NEW-WEBSITE/Programs/ECHO/How-To-Guides/20200408_ECHO_HowTo_Arbors_Final

- **Earth and Sand Play**

www.nwf.org/-/media/NEW-WEBSITE/Programs/ECHO/How-To-Guides/20200803_ECHO_HowTo_Earth

[SandPlay_Final](#)

- **Raised Planters**

www.nwf.org/-/media/NEW-WEBSITE/Programs/ECHO/How-To-Guides/20200408_ECHO_HowTo

[RaisedPlanters_Final](#)

- **Spool Tables**

www.nwf.org/-/media/NEW-WEBSITE/Programs/ECHO/How-To-Guides/20200408_ECHO_HowTos_SpoolTables_Final

(continued)

Community Science Apps and Projects

- **Bumble Bee Watch**
www.bumblebeewatch.org/
- **Butterflies and Moths of North America**
www.butterfliesandmoths.org/
- **eBird**
www.ebird.org/
- **The Great Sunflower Project**
www.greatsunflower.org/homepage
- **iNaturalist**
www.inaturalist.org/
- **Monarch Watch**
www.monarchwatch.org
- **Nature's Notebook**
www.usanpn.org/natures_notebook
- **Project Noah**
www.projectnoah.org/
- **Seek by iNaturalist**
www.inaturalist.org/pages/seek_app

Curricula and Educator Resources

- **The Globe Program Soils Module**
www.globe.gov/web/elementary-globe/overview/soils
- **Growing a Wild NYC: A K-5 Urban Pollinator Curriculum**
www.nwf.org/-/media/Documents/PDFs/Eco-Schools/Growing-a-Wild-NYC-Curriculum-FINAL-lo
- **Kids Gardening**
www.kidsgardening.org/lesson-plans/
- **National Wildlife Federation Eco-Schools USA**
www.nwf.org/Eco-Schools-USA
- **National Wildlife Federation Lesson Plans and Webinars**
www.nwf.org/Educational-Resources/Educator-Tools/Lesson-Plans-and-Webinars
- **National Wildlife Federation Monarch Mission**
www.nwf.org/Eco-Schools-USA/Resources/Curriculum/Monarch-Mission
- **Pollinator Partnership**
www.pollinator.org/learning-center/education
- **Project Wild**
www.fishwildlife.org/projectwild
- **The Soil Story Curriculum**
www.kisstheground.com/soil_story_curriculum_free_download/

(continued)

Field Journals

Field Journal Ideas

A field journal will help your students closely observe the natural world and translate their observations into words and drawings. At the same time, they will build communication skills, deepen their science understanding, and enjoy spending time outside.

- Choose a particular plant to observe through the seasons, or an animal home.
- Make observations within a designated amount of time. (How many animals do you see in five minutes; how many sounds do you hear?).
- Make observations in a designated area—on a particular plant, part of the plant, or area of the garden.
- If an insect or animal is moving quickly, take a photo and let students make a sketch from the photo.
- Use a guide to identify the animal or plant and label it next to the sketch.
- Press flowers and make leaf rubbings.

Field Equipment and Supplies

- **Acorn Naturalists**
www.acornnaturalists.com
- **BioQuip Products**
www.bioquip.com/

Field Journal Resources

- Make a Field Guide To Your Yard
<https://blog.nwf.org/2010/06/make-a-field-guide-to-your-yard/>
- Ranger Rick Nature Notebook www.rangerrick.org/magazines/ranger-rick/classroom-resources/nature-notebook/
- No Student Left Indoors: Creating a Field Guide to Your Schoolyard by Jane Kirkland
- How to Keep a Naturalist's Notebook by Susan Leigh Tomlinson

Grants for School Gardens

- **Annie's**
www.annies.com/giving-back/grants-for-gardens
- **Captain Planet Foundation**
www.captainplanetfoundation.org/programs/project-learning-garden/
- **Grow to Learn**
www.growtolearn.org/grow-learn-mini-grant/
- **Kids Gardening**
www.kidsgardening.org/garden-grants/
- **National Wildlife Federation's Trees for Wildlife**
www.nwf.org/Trees-for-Wildlife

(continued)

- **Whole Kids Foundation**
www.wholekidsfoundation.org/programs/school-gardens-grant
- **Wild Ones**
www.wildones.org/seeds-for-education/

Wildlife, Insect, and Plant Guides

Field Guides Series

For Adults:

- **Butterflies Through Binoculars**
- **Golden Guide Series**
- **Kaufman Field Guides**
- **National Audubon Society**
- **Peterson's Field Guides**
- **The Sibley Guide to Birds**

For Children:

- **Peterson's First Guides**
- **Peterson's Young Naturalist Series**
- **Pocket Naturalist Guides (Waterford)**

Wildlife Field Guides (Apps and Online)

- **Animal Diversity Web**
www.animaldiversity.org
- **Bug Guide**
www.bugguide.net
- **Butterflies and Moths of North America**
www.butterfliesandmoths.org/
- **Discover Life**
www.discoverlife.org/
- **Insect Identification for the Casual Observer**
www.insectidentification.org/
- **National Wildlife Federation Nature Guide Apps**
www.nwf.org/natureguides
- **Merlin Bird ID**
www.merlin.allaboutbirds.org/
- **Pollinator Partnership**
www.pollinator.org/
- **Xerces Society for Invertebrate Conservation**
www.xerces.org/

Plant and Habitat Guides

- **Audubon Native Plant Database**
www.audubon.org/native-plants
- **Ecoregional Plant Guides**
www.pollinator.org/guides
- **Lady Bird Johnson Wildflower Center**
www.wildflower.org/plants
- **National Wildlife Federation's Butterfly Heroes™**
www.nwf.org/Butterfly-Heroes
- **National Wildlife Federation Native Plant Finder**
www.nwf.org/NativePlantFinder/Plants
- **Pollinator-Friendly Native Plant Lists**
www.xerces.org/pollinator-conservation/plant-lists/
- **Pollinator Nesting Resources**
www.xerces.org/providing-nest-sites-for-pollinators/

Tips For Teaching Outdoors

The schoolyard can be a valuable extension of your indoor classroom learning space, but you're not alone if you feel uneasy about leaving the classroom behind. The following suggestions can help ensure successful lessons and experiences with students in the schoolyard habitat site.

Set Behavior Expectations

Establish rules for positive outdoor behavior before you venture outdoors, so that students are clear that "outside" is a classroom, too. Involve the students in the rule-setting, just as you may already do when setting indoor rules.

Plan Your Outing

The schoolyard can be a place for quiet contemplation, active play, intense observation, questioning, independent work, group projects, hard work, and relaxation. Before taking students outside, be clear which type of experience(s) you want to provide on a given day and communicate this to students indoors. Discuss where on the schoolyard students will be working, how long they will be outside, and what they will be expected to do before walking outside.

Provide the background and first steps of an activity while in the classroom to help focus the outdoor activity. As students become used to studying in the outdoor classroom, this indoor prep time will decrease greatly—it's especially important before the first few outdoor lessons.

Keep the First Experiences Simple

Keep plans simple the first few times you teach outdoors. Don't worry if you do not finish all that you have planned. Both you and your students need time to adjust to this new classroom environment.

Recruit Teachers, Parents, and/or Volunteers to Help

While not always possible or necessary, having an extra adult or two with you when teaching outdoors can be very helpful. Consider working with another teacher and taking both classes out together.

Visit your Lesson Site

Become comfortable with the teaching site before taking your students outside. Where can the whole group gather? Where can small groups work? Are there areas that illustrate concepts you plan to teach? What are the benefits and challenges of the site? Many changes occur as the seasons change, so remember to visit close to the time you will be using the site.

Know How to Get Students' Attention Outdoors

Have a clear signal for getting everyone's attention and gathering together. Practice it! Keep the sun in your eyes (out of student's eyes), the wind at your back (so your voice carries to your students), and stand in the center of a circle or line of students when sharing (so all can see).

(continued)

Be a Positive Role Model

Show enthusiasm, excitement, and a positive attitude. Make sure your students can hear this in your tone of voice and see it in your body language. Create a sense of adventure or mystery. Enjoy what your students find and share their discoveries with the whole group.

Allow Students to Explore Their Surroundings

To be safe, comfortable, and excited about learning in the outdoors, students need time to explore the areas in which they will be learning. Many of today's children do not have the opportunity to explore outdoor areas and need a chance to adjust. Emphasize observation. By using all of their senses, students can learn more about the things they investigate.

Learn to use “Teachable Moments”

Nature's spontaneous lessons will often be more compelling than the planned task at hand. Be flexible and remember that in the natural world everything is connected. Let the students experience nature in the moment and then link that moment back to your lesson.

Design Lessons that Flow

Design your lesson so that activities transition your students from idea to idea and from indoor to outdoor behavioral expectations. Identify an introductory activity to excite your students and acclimate them to the outdoors. Develop a list of fun strategies for moving your students from place to place, and use a closing activity to review what students have learned and to prepare them for returning indoors.

Be a Guide, Explorer, and Learner

You do not/should not/could not know everything about nature! Don't let a lack of knowledge slow you down. Create an atmosphere of investigation and share your excitement about learning new things. If you are excited about learning, your students will be excited as well. By responding to a question with “I don't know, but let's look it up!” you encourage students to guide their own learning.

Ask Guiding Questions

Avoid giving direct answers to student questions. Help students discover the answers on their own. If a student wants to know the name of something, ask him or her questions that can help them discover the answer, such as “How big is it?” “Where does it live?” or “How do you think it avoids predators?”

Engage All Students During All Activities

Students who are actively engaged in a lesson are less likely to have behavior issues. Give each child a role or task for each activity. For example, if your students are observing pollinators, have them work in small groups and have each student take on one of the following roles: observer, writer, artist, and identifier (uses field guides).

Appendix L: Tips For Teaching Outdoors

(continued)

Use Backpacks to Manage Supplies

Students can carry their own set of supplies in their backpacks. Backpacks allow students to keep their hands free for safer walking and participation in activities, and eliminate the chore of keeping track of loose items. Backpacks also allow students to take water bottles, layers of clothing, raincoats, and anything else they might need.

Encourage students to bring water bottles if they will be outside for more than 20-30 minutes. Light snacks are also a good idea if your students will be outside for a long time, hiking, or engaging in physical activities. On a hot day, a short rest in the shade can dramatically improve students' attitudes and reduce behavior problems.

Consider creating an educator backpack to take with you for outdoor lessons. Include props or games that can be used in activities and keep students focused. Also include a first aid kit, extra pencils, paper, gloves, hand lenses, rulers, a tape measure, field guides, viewing boxes, plastic bags, and anything else you think your students might use when outside.



Photo: Emily Fano.



CERTIFIED WILDLIFE HABITAT
FOOD • WATER • COVER • PLACES TO RAISE YOUNG
This property is recognized for its commitment to maintaining the essential elements of wildlife habitat. nwf.org/garden

Today

is a Great

Day to

Learn

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Mango Tree ←

Photo: Maria Elena Garcia.





National Wildlife Federation
11100 Wildlife Center Drive
Reston, VA 20190
www.nwf.org/garden-for-wildlife