

Chapter 5

OUTDOOR LEARNING

AREAS

An outdoor learning area is a natural resource that is available to students for conducting field investigations outside the classroom setting. Although these sites are used primarily for field investigations, they provide learning opportunities all across the curriculum. The ideal site is located on the school grounds and is easily accessible for frequent visits. If space is a problem, consider seeking permission to use areas in nearby parks or other public facilities that are within walking distance from the school or are a short bus ride from the school. Most outdoor learning areas are associated with wildlife habitats and may include ponds, wetlands, wooded areas, native prairies, a butterfly garden, or a nearby field.

The process of establishing an outdoor learning area challenges the students' critical thinking and decision-making skills while incorporating reading, writing, mathematics, science, and social studies, as well as the visual arts. This chapter encourages school districts to establish an outdoor learning area with the help of students, faculty, parents, and the local community.

A school's outdoor habitat is called by many names, including outdoor classroom, school sanctuary, nature study area, or outdoor learning area. No matter what name the area goes by, it is a piece of wildlife habitat that can be designed on a school's campus. The habitat becomes an exploratory classroom where students interact with the environment and observe living organisms in their natural settings. The excitement of learning is in the habitat itself.

Creating a School Habitat

Creating an Outdoor Learning Area

A natural habitat provides the best type of area for student learning because the plant and animal relationships are already established in these areas. Preserve sections of the natural habitat prior to constructing new school buildings, renovating school grounds, or installing portable buildings. It is more difficult and costly to reconstruct the habitat later. When constructing new buildings, make every effort to identify and preserve a section of natural vegetation on the construction site. Select the best possible location for the future outdoor learning area, and protect that area with security fencing during the construction phase.

The Planning Committee

Having an organized planning committee is key to the success of an outdoor learning area. The committee may include students, teachers from all subject areas, maintenance personnel, school administrators, school board members, parents, business representatives, and natural resource professionals. Committee members should be encouraged to visit established outdoor learning areas so that they can gather ideas and learn about problems associated with creating an outdoor learning area. The committee may form subcommittees to use the member's expertise and share the work necessary for success. Some areas of responsibility include:

1. establishing goals and planning, designing, and developing the outdoor learning area
2. connecting the project to the school's curriculum
3. developing a budget and securing funds
4. implementing the project and ensuring its maintenance and sustainability
5. connecting the project to the community

Site Selection Criteria

The school curriculum should determine what type of outdoor learning area to create. A survey of the teachers can provide information about the types of activities they could conduct in the habitat. The next step is to select a site.

The outdoor learning area should serve as a site that

- provides excellent learning opportunities for the students and functions as an integral part of the curriculum,
- provides a quality habitat for wildlife, and
- becomes a permanent feature on the school's grounds.

The following are criteria for a selecting a good site:

1. The site should be located on school grounds whenever possible, or developed on property owned by the school district.
2. The property should not be slated for future development (such as a new playground or portable buildings).
3. Locate the site away from high-traffic areas, such as highways and areas heavily used by the students, to reduce disturbance of the wildlife.
4. Avoid areas that may need to be used as points of access for machinery and maintenance equipment.
5. The site should be easily accessible and located near the classrooms that will be using the site.
6. The site should provide good growing conditions for a variety of plant species.
7. The area should be open, providing easy access for wildlife.

Evaluating the Site

Once a site has been selected, committee members should create an inventory of existing features, including the native plants. These features may influence the plan for the outdoor learning area your committee will develop. The following items should be included in a detailed inventory.

Utilities

Check for items such as overhead utility lines, buried cables, water lines, water faucets, fences, and air conditioning units.

Soil Type(s)

Take soil samples to determine the soil type (clay, sand, loam, etc.). For more information on how to determine the soil type, refer to the *Creating a School Habitat* manual. Local offices of the Natural Resource Conservation Service may also be contacted for assistance.

Existing Vegetation

Make a list of all the plants growing on the site that you wish to keep. Evaluate existing plants for their benefits to wildlife. Consult reference books or local professionals for assistance. Keep the plants that will be of value to the wildlife. Consider removing the nonnative or invasive plants that might cause problems for the habitat.

Natural Light Patterns

Record the amount of natural light each section of the site receives during the day. Use this information to guide your planning and plant selection.

Drainage and Slope

Check the drainage patterns and the ground slope on a sketch of the site, noting the direction that water flows. Also, note any areas that retain water frequently or places where buildings or features drain onto the site.

Surrounding Properties

Survey features on surrounding properties that may affect your outdoor learning area, such as parking lots, noisy and aggressive pets, overhanging trees, tall buildings, or existing habitat. These features may be beneficial or detrimental to the habitat.

Security

Consider constructing a fence around the area to guard against potential problems, such as unsupervised children wandering into the site.

Wildlife Species

Research any wildlife species that may inhabit the area. Would wildlife still be able to access the site once it has been developed?

Creating a Habitat

The wildlife habitat is the heart of an outdoor learning area. A successful habitat provides the necessary components (food, water, shelter, and space) of a natural habitat, including beneficial plants, accessible water sources, and adequate space for wildlife. Secondary components may include supplemental feeders and nest boxes.

Students are provided with rich opportunities for outdoor studies once the habitat is established and the wildlife begin to appear. The following information will help attract wildlife to the site.

1. Mimic the kinds of habitats used by native wildlife in the area—for example, a wooded area, wetland, prairie, wildflower meadow, or desert. Remember, local wildlife require local habitats.
2. Research the types of plants that will be needed for each habitat, using native plant species.
3. Plan the locations for the habitat(s), and design the outdoor learning area(s) according to the growing conditions on the site.

Diversity

Using a variety of plant species will attract more types of wildlife. For example, if a habitat has two oak trees, grass, and nonnative shrubs, only a few squirrels may visit the site. However, if a variety of nectar and berry-producing plants are used, other wildlife, such as butterflies and birds, will be attracted to the site.

Layers of Vegetation

Research shows that two-thirds of the bird species studied used plants in the lowest two-thirds of a habitat. Yet, most people remove those parts of the habitat because they tend to like a “manicured” look. However, a successful habitat does not need to look messy; but it does need to include all of the necessary components of a successful habitat.

To make a habitat successful, replicate the layers of vegetation by including a variety of trees, shrubs, and other plants that produce seeds, nuts, berries, or nectar. This will provide important sources of food and may attract a variety of wildlife to the site.

Carrying Capacity and Limiting Factors

A habitat can properly support a limited number of animals. This “carrying capacity” is determined by the quantity and quality of the habitat components. Every population is controlled by “limiting factors.” Limiting factors may include habitat components that are in short supply, such as water or food. Predators, automobiles, disease, and weather may influence a population’s density.

For example, the natural vegetation growing in a pond maintains the natural balance of nutrients in the water. If the pond contains too many turtles, the pond’s vegetation may be too rapidly consumed. Their waste products will contribute excess nutrients to the water, which are taken in by fewer existing aquatic plants. The result is a rapid growth of algae in the water. By relocating some of the turtles, the ponds’ natural balance and carrying capacity can be restored.

Avoid releasing animals (domestic or rehabilitated wild species) into your habitat. There may be no limiting factors to control their population growth or their effects on the habitat.

Native Plant Species

Native plant species are attractive, interesting, and beneficial, but many people rarely take the time to discover them. A “native” plant is one that is indigenous to the area and grows without the intervention of people.

Benefits to Students

Through the study of native plants, students will gain an understanding of the role native plants play in an ecosystem and the relationships that exist between plants and animals.

Reduced Maintenance

Reduce the time, labor, materials, and costs involved in habitat maintenance by selecting native plant species. Plants that are native to a specific region are adapted to the growing conditions there. Each plant type exhibits specialized defenses against drought, floods, freezes, diseases, and insect damage. When working with the plants’ individual growing preferences and natural defenses, the result is lower maintenance.

Plant Location

Just because a plant is native does not mean it can survive in undesirable conditions. For example, if a plant prefers to grow in full sunlight in well-drained soil, it may not survive in a wet, shaded part of the site. Place each plant species in its preferred location for the optimal growth and health of the plant.

Benefits to Wildlife

Wildlife species readily recognize native plant species as sources of food and shelter. If non-native plant species are planted, local wildlife may not use them for food or shelter at all.

Providing a Variety of Food

Many kinds of birds and other wildlife will be attracted to a variety of food, such as nuts, berries, fruits, seeds, nectar, and insects. The greater the variety of food, the more wildlife diversity will appear in the habitat. Plants represent sources of food and provide shelter, travel corridors, nesting and roosting sites for wildlife.

Multi-Benefit Plants

Many plants supply a food benefit to more than one species of wildlife. For example, sunflowers furnish nectar for butterflies and provide seeds for birds in the summer and fall. Decaying wood from dead trees, or snags, provide food for small insects. Woodpeckers and other insect-eating animals feed on the insects in the decaying wood. Evergreen shrubs, such as yaupon holly and cedar, supply berries and shelter, and native grasses become excellent sources of seeds and shelter during the fall and winter months.

Year-Round Sources

A school habitat will exist year round and through each season to benefit the wildlife. Select plants that provide food sources in spring, summer, fall, and winter to benefit wildlife.

Insect Food

A good habitat becomes home to a variety of insects. Leaves, nectar, fruit, and other food sources entice insects to inhabit the site. These insects become food for the other animals. Insects are a vital ingredient in the habitat, and using pesticides should be avoided; instead, organic gardening techniques and integrated pest management should be practiced.

Providing Shelter and Space

Animals need shelter from harsh weather conditions, concealment from predators, night roosting or resting areas, and nesting sites. Careful selection of plants for the site can provide animals with a variety of sheltered places.

Shelter

Some animals prefer thick evergreen shrubs as winter shelters. Clump shrubs to form sheltered thickets. Leaf litter, rock walls, wood or brush piles, rotting logs, and hollows under rocks can provide shelter for smaller animals such as lizards, snakes, skinks, and toads, as well as for insects and spiders.

Space

Space is defined as the area occupied by an individual or a family group. The size of an animal's living space depends on the animal's body size and its habits. An animal's home range is the space it requires to find the food, water, and shelter it needs to survive.

In your outdoor learning area, space will be limited to the area you plan to develop. The activities should focus on increasing the quality and availability of food, water, and shelter at the site.

Providing Water

Water is a vital ingredient in every habitat. Water can be provided in a variety of ways, such as in ponds, shallow pools, birdbaths, or shallow containers. It is important that the water supply be kept clean and constant.

Birdbaths

Make the water accessible to a variety of wildlife. An elevated water source is limited to birds and squirrels. Reduce hiding spots for predators by removing tall vegetation from around the edges or base of the birdbath.

If the bowl is deep or has steep sides, add rocks to the birdbath to give birds better access to the water.

Regular maintenance is required. To clean the birdbath, use a weak bleach and water solution, scrub with a strong brush, and rinse several times to eliminate any remaining bleach. Refill with fresh water.

Keep the water cool by placing the birdbath in partial shade. A branch hanging over the bowl allows birds a place to perch and survey the surrounding area for predators. However,

leaves from the tree can make it difficult to keep the water clean.

Place the birdbath in view of the classroom to allow students the opportunity to observe birds in their natural surroundings.

Ponds

Every pond should have gently sloping sides, shallow ledges, or depressions where puddles can form around the edge. Wildlife will drink and bathe in these puddles. Most wildlife will use water that is at a depth of one to three inches.

Check with school district personnel to determine what the school's policy is regarding ponds on school grounds.

Constructing a Pond or Wetland Area

One of the purposes of an outdoor learning site is to bring wildlife into view for students to observe, study, and appreciate. No other component of a habitat does this as predictably as a water source does. A pond or wetland area has the potential of attracting the most wildlife diversity and also allows students to observe the life cycles of plants, invertebrates, and amphibians.

The process of establishing a pond or wetland area on a site can be divided into four phases:

- Site selection
- Design
- Installation
- Maintenance

Site Selection

Consider the topography, hydrology, available sunlight, soil type, and access to the site when selecting the location for a pond or wetland area.

Topography

Note those areas that appear to be in a low-lying spot where water tends to stand, or where the soil stays moist for an extended period of time. If no natural collection areas exist, then note the flat areas that might be suitable for an excavation.

Hydrology

Where will the water come from for the pond or wetland area, and how will it get there? Most ponds located on school campuses will not receive enough rainfall to sustain them during a typical summer. Determine what the potential watershed might be before constructing a large capacity pond.

School yards, athletic fields, parking lots, and building roofs may offer opportunities to collect and direct rainfall to the pond or wetland area. However, most sites will require additional water from the municipal water system. In parts of the state where municipal water is limited, you may have to rely entirely on rainwater. This may be a limiting factor when determining the size of the pond or wetland area.

Sunlight

Most wetland plants require at least five hours of sunlight daily to thrive. Trees and buildings may cast shadows on a pond and should be considered when selecting plants.

Soil Type

The best and least expensive pond is a natural one that results from digging a hole in suitable soil and filling it with water. The key to a soil's ability to hold water is its clay content.

Simple tests can be conducted to determine the soil's clay content.

Access

The chosen site must be accessible for construction, student investigations, wildlife recruitment, and maintenance. If the pond or wetland area becomes a regular part of the school curriculum, it must also be wheelchair accessible.

Design

The planning committee should consider the following when designing a pond or wetland area:

- Shape
- Size
- Depth and profile
- Liner options
- Preform designs
- Access

Shape

If the soil proves to be suitable for a natural pond, the shape can be as irregular as you prefer. Curves, dips, peninsulas, and coves provide more shoreline and better hiding places for animals.

If the soil is not suitable for a natural pond and, therefore, some type of liner material is necessary, then complex shapes may not be practical. The need to use clay or synthetic liners will likely require shapes that are more circular or rectangular.

Size

Pond size is limited only by site restrictions, needs, hydrology, and budget. Most ponds will require an additional water source to maintain the water level throughout the year.

A pond approximately 20 feet wide and 20 feet long, with an average depth of one foot, will hold approximately 3,000 gallons of water. Water cost can become a factor in deciding on pond size as well as excavation and disposal of the soil.

Depth and Profile

Pond sides with gradual slopes allow for the establishment of diverse plant communities and easy access for wildlife. If children are allowed at the edge of a pond, gentle slopes will limit their missteps to wet feet only and help prevent them from becoming completely submerged.

A ratio of 3 feet of horizontal length for every 1 foot of vertical depth is sufficient. Some sides of the pond may be steeper and others flatter, depending on the need. A maximum depth of 2 feet is sufficient for most ponds on a school campus.

In northern parts of Texas, a depth greater than 2 feet may be required to prevent the pond from freezing solid in the winter. Some municipalities may regulate ponds according to their depth. Check local codes before beginning construction.

Liner Options

If the soil will not hold water, then consider using lining materials to modify the excavation.

Bentonite, a processed clay product, can be mixed with existing soils to form a waterproof lining. However, the product can be expensive, and its application may be difficult.

Natural clay is another alternative and may be purchased in some areas of the state. The clay must be compacted once it has been spread onto the excavation area to create a waterproof liner.

Synthetic liners made of vinyl, polyethylene, or butyl rubber are available from many sources. These materials vary in cost depending on the thickness and width of the liner needed. Be sure to check the liner's temperature tolerances to ensure that it will withstand freezing temperatures in your area.

Preformed Ponds

Preformed, molded plastic and fiberglass ponds are available from manufacturers. However, most preformed designs are not suitable for wildlife since there are no shallow areas with gentle slopes included in the designs.

Access

School campus ponds and wetland areas may not be of sufficient size to withstand the impact of several students gathering around the vegetated areas at one time. A platform or deck that extends over the pond's edge or into the wetland area can protect delicate vegetation and limit the disturbance of wildlife. It can also help prevent students from returning to class with muddy shoes or wet feet.

The Americans with Disability Act requires that students with handicaps have access to these types of facilities. See *Texas Safety Standards for Kindergarten–Grade 12* for additional information about these requirements.

Pond Maintenance

Pond maintenance consists of maintaining water levels and controlling excessive vegetation. In shallow ponds (3 feet deep or less), vegetation may eventually cover the entire water surface. Less desirable plants, such as cattails, can cover a pond in one or two growing seasons and will need to be controlled.

Ideally, half of the water surface should remain open and free from vegetation. This may require thinning plants from the pond on a regular basis.

Aquatic Plants

Carefully choose aquatic plants that are native to your area. Many aquatic plants can become established quickly and grow rapidly. Look for diversity in size, structure, and growth habits when selecting the plants.

Include emergent, submergent, and floating-leaf plants in the selection. Be aware that many nonnative species have become established locally and have caused problems in our natural waterways (Table 5.2).

Table 5.2
Aquatic Plants Prohibited in Texas

• Alligatorweed	• Water spinach
• Eurasian water milfoil	• Rooted water hyacinth
• Giant duckweed	• Torpedograss
• Salvinia	• Lagarosiphon
• Hydrilla	• Paperbark
• Water hyacinth	• (Melaleuca)
• Water lettuce	

These plants are highly invasive and detrimental to a pond. It is against the law for you to possess these plant species. Check with a local resource professional for more information concerning these plants.

Filtering the Pond Water

Artificially filtering the water in the ponds should not be necessary because the plants act as a natural filter. A diverse mix of native aquatic plants will maintain proper water quality.

Mosquito Control

Mosquitoes are part of the natural environment and can be expected in the pond and wetlands area. If properly constructed and maintained, the pond will not be a source of mosquitoes but may actually help to control them.

A mosquito fish, such as *Gambusia* sp. or other such predatory fish species, will consume the eggs and larvae, thus controlling the mosquito population.

Another method for controlling mosquitoes is through the use of the bacteria, *Bacillus thuringiensis israelensis* (BT). Introducing this type of bacteria into the water will control the mosquitoes without harming any other life in the pond.

The Butterfly Garden

Planting a butterfly garden creates an outdoor laboratory for students to observe one of nature's beautiful insect groups while providing a source of food for adult butterflies and a place where they can continue their life cycles. A butterfly fluttering from one flower to the next drinking nectar is at the same time performing an important function in nature: pollination. Second only to bees, the butterfly plays a crucial role in the pollination of plants. Over 17,500 species of butterflies have been identified around the world, with approximately 700 species found on the North American continent.

The feeding habits and life cycles of a variety of butterflies can be directly observed in the field, or the butterfly larvae can be brought to the science laboratory and cared for until they emerge as adults. The use of insecticides and loss of habitat have affected butterfly populations and significantly reduced the number of species. Under no circumstances should insecticides be used in the outdoor learning area.

By protecting, restoring, and managing natural habitats in our own backyards, we can help protect these beautiful creatures by creating conditions that promote their abundance and diversity, instead of destroying them. The reintroduction of natural landscape elements into neighborhoods may be one of the greatest contributions to ecosystem conservation that we can make.

Texas Parks and Wildlife
Nongame and Urban Program, 1998

Building a Butterfly Garden

A well-planned butterfly garden can serve as an outdoor laboratory for students. Wildflowers common to the area should be used as the foundation plants to lure butterflies to the site.

Location

A major part of the butterfly garden should be located in an area that will provide full sun for approximately 6–8 hours a day. The remainder of the garden should support plants that require less sun exposure.

Butterflies are cold-blooded organisms that require a warm area in order to raise their body temperatures on cool mornings. Rocks or logs are important as places where the butterflies can bask in the morning sun. If these features do not exist, they can be added easily to the site.

Attracting Butterflies to the Garden

Wildflowers and other flowering plants will attract butterflies to the site. However, butterflies require minerals and other nutrients as well as the sweet nectar they receive from the flowers.

Butterfly Food

The feeding habits of butterflies differ from those of the hummingbird. Butterflies prefer to visit flowers located in full sun. Butterflies are attracted to masses of flowers in shades of pink, purple, yellow, and orange.

Fragrant, small tubular flowers clustered in “bouquets,” such as lantana, verbena, or viburnum—or composite flowers, such as sunflowers—entice butterflies to sample the rich nectar. Select a variety of plants so that flowers are blooming several months of the year to provide sources of nectar to the butterflies.

Plant tall nectar-producing trees, shrubs, and vines around the habitat’s perimeter as windbreaks so the butterflies can avoid strong winds while feeding.

Larval Food

Butterflies choose specific plant species, called larval host plants, to deposit their eggs. Don’t panic when a caterpillar appears munching on leaves in the habitat. The caterpillar may become one the butterflies or moths that are desired in the habitat.

For example, the monarch butterfly selects milkweed plants to lay its eggs. The gulf fritillary choose the tender leaves of the passionflower vine to lay her tiny yellow eggs. Several swallowtail species lay eggs on dill, fennel, or citrus plants.

Before selecting host plants for a butterfly garden, research the species of butterflies and moths that are common to the area. Use field guides and identification keys to help identify the various caterpillars in the habitat.

Don’t spray the flowers with strong jets of water. This washes away the nectar and tiny caterpillars that are feeding on the plants. Instead, try watering the plants with a soaker hose or drip irrigation.

Butterfly Puddling

Butterflies require minerals and other nutrients as well as the sweet nectar they receive from flowers. Many butterflies are “puddlers,” meaning that they gather at places rich in the kinds of nutrients butterflies need, such as moist soil, rotting fruit, oozing sap, and animal feces.

Providing a moist area with one or more of the ingredients mentioned may increase the frequency and abundance of butterflies at your site.

Planting Wildflowers

Correctly planting wildflowers native to the area is an important step in creating a successful garden that attracts a variety of butterflies and other insects.

Select an area that drains well for the garden. Eliminate existing vegetation that might compete with the seedlings. Prepare the garden bed by raking the surface with a sturdy rake. Level the soil by breaking apart large clumps of soil.

Evenly broadcast the seeds over the freshly raked soil. Some experts recommend combining the seeds with sand or other material before broadcasting them onto the soil. This will ensure a more uniform distribution of seeds.

After the seeds have been scattered, walk over the garden bed or use a commercial roller. This will press the seeds into the soil to the correct depth. Do not add additional soil or other material that might cover over the seeds. Planting wildflower seeds too deep will reduce the number that will germinate successfully in the garden.

Keep the garden moist for approximately 4–6 weeks so that the seedlings can become well established. It is important that the soil not dry out completely or receive too much water.

It should not be necessary to add additional fertilizer to the soil. Many wildflowers are well-equipped to survive in very poor soils.

Wildflower seeds can be ordered from speciality companies in several locations in the state (Appendix C).

Some species of plants may have characteristics that are undesirable for the habitat. For a listing of poisonous plants refer to *Texas Safety Standards: Kindergarten–Grade 12*.

Guide to Common Texas Wildflowers

A list of some common Texas wildflowers that can be planted in a prairie setting, butterfly garden, or flower garden at the school campus can be found in Appendix D. These are only a few of the 700 species that are found in the state.

An example of an outdoor learning area constructed between two wings of a school can be found on page 127. It incorporates several of the features that have been discussed in this chapter.

The information included in this chapter was taken from *Creating a School Habitat: A Planning Guide for Habitat Enhancement on School Grounds in Texas*, written by Diana M. Foss, Texas Parks and Wildlife, and Ronald K. Jones, U.S. Fish and Wildlife Service.

To obtain a copy of the *Creating a School Habitat*, please contact:

Texas Parks and Wildlife Department
Wildlife Diversity
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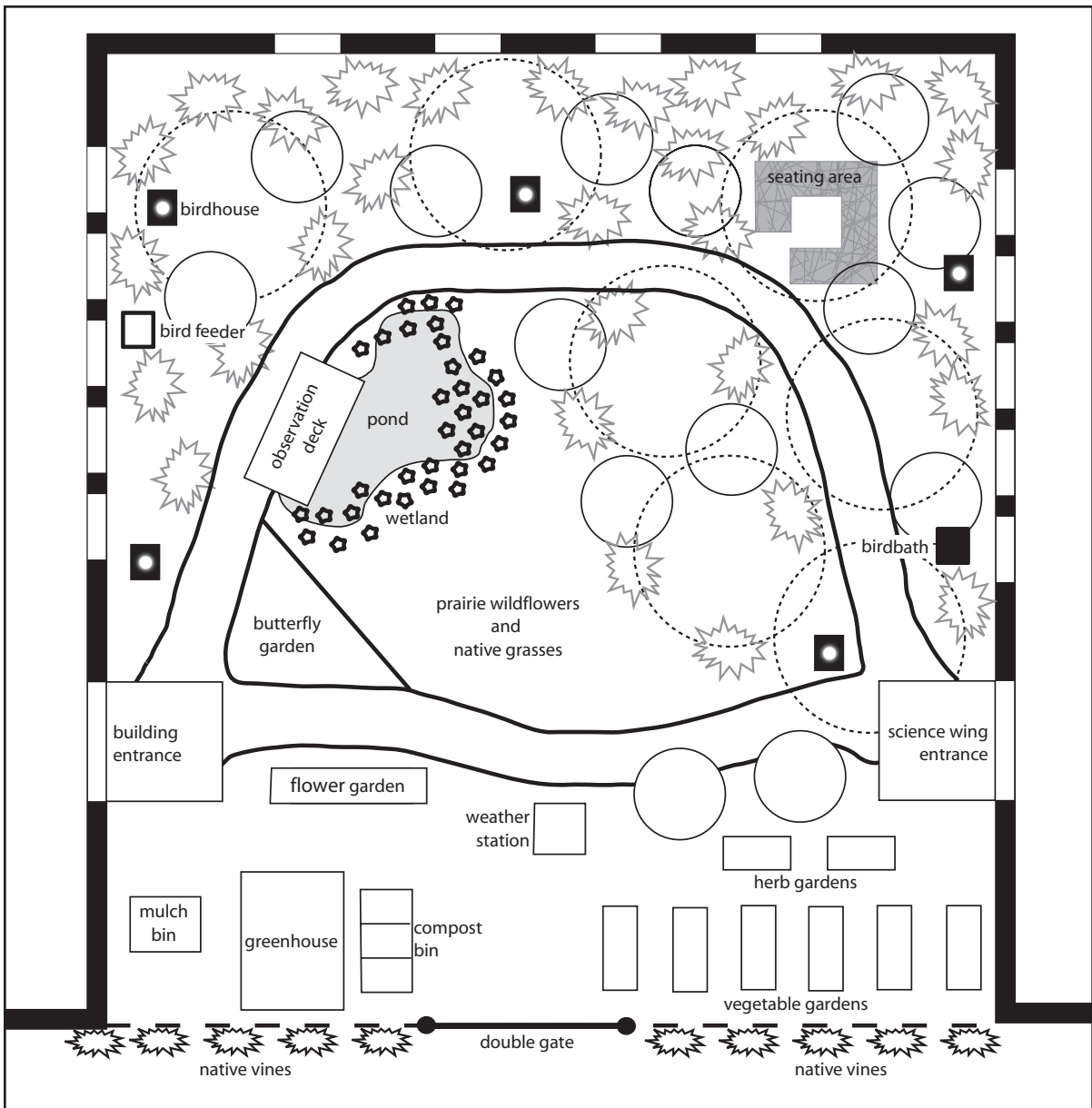


Figure 5.3
Outdoor Learning Area Design

