

Our Quiet Neighbors: Connecting with Nature in the Butterfly Habitat

Janet Purvis
Durkee Elementary School

Treat the earth well: it was not given to you by your parents; it was loaned to you by your children. We do not inherit the Earth from our Ancestors; we borrow it from our Children. - Ancient Native American Proverb

INTRODUCTION

I grew up on a farm where I was not only allowed to dig in the dirt, but also encouraged to grow my own vegetables and flowers. My major chore was feeding the chickens and gathering eggs, but that did not take long and I had plenty of time to dig in the dirt. My grandmother and great grandmother would plant long rows of vegetables in the family garden, and my granddad would plant a whole field with peanuts, watermelons, and cantaloupes. During the summer, our dinner and supper tables were always full of freshly prepared vegetables. Our desserts were the giant Black Diamond watermelons and sun-ripened cantaloupes that Granddad brought in from the field and cooled down in a tub of fresh cold water from the well. Being only seven, I wasn't much help, but I soon learned how to attack the weeds with a hoe and not chop down the vegetables. The vegetables that did not end up on the summer menus were canned and lined up on the cellar shelves. The entire family would eventually enjoy the "fruits of their labor" when the garden was covered with snow.

I spent many hours digging worms, catching grasshoppers, and chasing butterflies across my granddad's hay meadow. Frogs and tadpoles were another fascination, even if the pond and river were off limits unless my granddad was with us. Various reptiles crossed our paths as we walked to school down the dusty country road; in particular, I recall one Blue Racer that was intent on chasing us almost every week. We kept a sharp eye out for it but to no avail: we still went screaming down the road with that snake at our heels. The snake might have thought it was fun, but I didn't. We were always on the lookout for raccoons, skunks, opossums, and bobcats. It was a special occasion when we got to see a doe and her fawn leap across the fences and head for the densely wooded area on the hill behind our house.

When my mom remarried, we moved across the river where I was even more involved in gardening and had the responsibility of caring for the chickens, again. I really enjoyed the gardening. I had had too many black snakes invade the very last nest in the chick house intent on stealing an egg or two and was very intimidated by the old setting hens that just did not want me to take their precious eggs. After a week or so of getting pecked, I would just pass them by and eventually the eggs I had left would hatch. They were so proud of their babies; they would strut around the yard clucking so everyone would look. I was just glad that I didn't have to worry about getting pecked.

UNIT BACKGROUND

Children who grow up in the city have not had the same opportunity as I did to plant seeds and to watch their food grow, to dodge bumble bees on the okra flowers, share honeysuckle nectar with hummingbirds as they zipped from flower to flower, follow a butterfly as it sips nectar from the flowers along the river bank, or discover the wonders of a newly hatched bird being fed by its parents. I want to open that sense of wonder to the treasures of their urban neighborhood by showing them what they don't realize is already there.

For example, the repetitive, melodic songs of the mockingbirds, the soft chirping of the sparrows, the squeaky voice of the grackles, and the call of the Cardinal, "pretty, pretty, pretty," are everyday background noises. Cloudless sulphurs, giant sulphurs, Painted Ladies, giant swallowtails, monarchs, and viceroys drift silently on the wind, sitting ever so softly on the ever-present wildflowers along the ditches. Tiny unidentified butterflies dart in and out of the tall grass, stopping only long enough to take a tiny sip of nectar from the smallest flowers. Bluebonnets, Indian paintbrushes, coreopsis, and a cacophony of yellow, purple, blue, and pink wild flowers bloom and fade into history as spring turns into summer. After the warm spring rains, unnoticed by passersby, toads lay their eggs in the ditches that only days before were dry and filled only with "weeds." If one knows where to look, there is an abundance of wildlife – plants and animals-in the urban landscape.

Children living in the city watch in amazement as squirrels scurry across the street on their high wire above the traffic, and they can watch the butterflies, but they rarely get to see what goes on in the life cycles of these animals. The only way they know that a raccoon or an opossum lives nearby is when they see it as road kill or are startled by the "pest" at the garbage dumpster. Rats, mice, snakes, and roaches may be a bigger part of their day to day discoveries as they are more likely to make an appearance when humans are out and about. Each year, giant live oaks and post oaks litter the yards with leaves and sprinkle the ground with acorns; huge pecan trees rain down nuts; magnificent magnolias make a showing with brilliant, white blooms and red seeds; but children don't seem to notice. They don't even know the names of the trees they see every day. The animals and plants in their backyard or on our school ground are as foreign to them as a quiet evening watching stars or catching fireflies.

With guidance, they can become familiar with the animals, insects, and plants that live in our "backyards" and learn about the changes that animals and plants are making to their own habitats so they can survive in the urban landscape. Each lesson in this unit will build knowledge of students' immediate surroundings. Being able to identify plants and trees that grow on our school ground will be the first step toward learning to identify all the trees and plants in their own yards, in the neighborhood parks, and along the streets on their way to school. Combined with the identification of plants and trees will be lessons on identifying the various wildlife that use these plants as food as well as the

wildlife that live in the trees. Students will be expected to keep a journal of all their experiences during the lessons in this unit. The goal of this set of lessons is to help the children become more aware of all the plants and animals that live in their neighborhood. With that new awareness, they will hopefully learn to be more observant.

Furthermore, since conservation should be an integral part of the urban child's world, they need to learn how to protect the remaining natural habitats in our city and rebuild those that have been destroyed. At the very least, I want children to learn that each species has a place in our society and it is possible for all of us to live alongside each other in harmony. I want to take that knowledge to the next level and ensure that each child realizes how valuable each plant and animal is to our society and cultivate the desire to protect the natural habitats of each.

GETTING STARTED

This unit, which is primarily focused on the butterfly habitat, will also be used to teach students methods to use to identify birds, insects, reptiles, butterflies, caterpillars, mammals, and plants that inhabit our part of the world. Once they learn how to identify and can identify our quiet neighbors, further instruction will instill in them the knowledge required to build or rebuild the natural habitats necessary for the survival of the wildlife in our urban setting.

Raccoons and opossums frequent the urban trashcans at night, rummaging for bits of food. They make a mess and are gone by daybreak. Skunks are normally just smelled and not seen, and armadillos seem to try to stay out of the city as much as possible. They are seen mostly on the outskirts of wooded areas and in areas where the woods have just been cleared. With the number of fire ants increasing, armadillos have to really hunt for the grubs and other creatures under the ground before the fire ants find them. It has been noticed that the armadillo seems to be moving north as the fire ant explosion destroys its natural food sources. Animals and insects have made drastic changes in their own lives just to survive, and we can make small changes in ours so they do not become another endangered or extinct animal.

The first lesson is in two parts. (Lesson A-1: Safety First) The first part will be to identify plants and animals that are to be observed and not touched, especially since poison oak/ivy grows along the fencerow. Poison oak/ivy, when touched, can cause skin eruptions and intense itching. This is caused by an allergic reaction to the oils in the plant. I know, as I used to get poison ivy every summer from the time I was in the third grade when my brother told me that as long as I washed when I got home I would be okay. He had me rub the leaves all over my hands. Oh, I washed real well with soap and warm water but woke up the next morning with my eyes swollen shut. After the doctor left (Yes, it was when doctors actually made house calls.), we finally told mom why I had such a terrible case of poison ivy. I missed the Fourth of July parade and fireworks that year. I actually suffered every year until just recently. Poison oak/ivy is not all bad

however. Animals seem to be immune to it, and the poison oak/ivy berries are a favorite food of some birds. When considering animals, the fire ant will be first on the “do not disturb” list followed closely by the Black Widow spider and all snakes. Others will be added to the list as necessary. Safety rules will be printed out and included in students’ field journals.

Once the safety lesson has been completed and the students understand the necessity for safety rules, they will be ready for the second part of this lesson. They will learn how to use magnifying glasses. (Lesson A-2: Close-Up Encounter) This lesson is also the first opportunity for a “mini field trip” on campus. Each student will be issued a magnifying glass and a tissue. The entire class will then go on a “field trip” to find insects and other stuff they can examine. Learning how to use the magnifying glass is important if small insects and plants are to be identified properly. They will use the magnifying glasses to inspect any small insect or parts of insects and plants that can be found on or around the trees and bushes. Magnification may help solve some of the mysteries of nature. I’ll bet you didn’t know that the butterfly has a forked tongue or that its wings are actually made of colorful scales. Magnify it and you will see. Along with proper usage, they will also learn how to clean the magnifying glass correctly. Using shirttails only scratches the lens. Teaching students to take care of all class tools is imperative.

Insects that can be brought back to the classroom for further observations will be placed in bug barns. These bug barns can be as simple as a plastic jar with holes cut in the lid or a wood and mesh screen one that can be made or purchased at a craft store. I happened upon insect observation kits at Big Lots and purchased a class set for a dollar each. The kits contain a pair of plastic tweezers and a magnifying glass inside a plastic case that has three magnifying compartments with separate lids all contained in the lid. I also have a large bug barn that my husband constructed of wood with mesh screen on three sides and a hinged door on the front. It is rather elaborate and about twice the size of most I have seen. I painted it barn red with white trim, and my husband added white picket fences on each side and glued a fancy pig on one side and a milk cow on the other. I put a shelf inside the barn and have some chickens setting on the shelf. It looks a lot like the barn my granddad had on his farm when I was six, except that his was not painted red. So far it has served as a temporary home for a number of Luna moth cocoons, a red-slider turtle, loose monarch pupas, several insects, our first monarch butterflies, and a gecko. The three mesh sides allow a better view of the insect inside and also allow air to circulate through the container. Students are able to observe and get a close look without touching the insect or whatever is inside. Not only is the occupant in a relatively safe place before it is returned to the wild, but the students are learning to observe and protect. Anything that is placed in a bug barn will be released as soon as the students have finished their observations. Before anything that is captured is brought into the classroom, the students will use a field guide to make a preliminary identification to make sure it is harmless. Safety is to be the first order of business in every lesson and on every field trip.

PLANTS

The process of identification of plants will include learning the kinds of plants that are on the school grounds. The students will begin with the trees on campus. (Lesson B-1: I Spy, I See a ___ Tree.) The Durkee Elementary campus has a lot of beautiful trees. Some are quite large and majestic. Inside the courtyard, where we have the butterfly habitat, there are six mature trees. The showiest is the flowering crab apple. Pink and white blossoms covered the limbs last fall, and then it bloomed again this spring as though it had forgotten when it was supposed to bloom. There are two live oak trees; one is about 50 feet tall. Twice a year the children watch as the leaves swirl around on their way to the ground: first in the spring and again in late fall or early winter. In the spring, the new bright-green leaves mix in with the older, dark-green ones. Birds nest in the thick branches in the spring and in the fall squirrels scurry through the limbs on their way to gather the nuts that have fallen from the pecan tree. They, the squirrels, are in competition with some of the teachers for those valuable nuts. The pecan tree is the last tree to get leaves in the spring, and the first one to lose its leaves in the fall. When I point out that it is not a native pecan, the students are unaware that there are differences between pecan trees. The pecan tree's bark is lighter gray than the oak tree's bark and looks rather flaky. The southern magnolia, between the live oak and the lacebark elm, puts on quite a show in the spring. Without warning, the huge buds open to reveal bright white flowers, releasing a soft sweet fragrance. Just as quickly as they open, they begin to turn brown, and the soft velvety petals fall off to reveal the beginning of the seedpod. When the seedpods are mature, they are studded with little, red, bean-like seeds, which fall to the ground. These red seeds are food for some of the birds and squirrels that inhabit our campus and a curiosity for the students.

Until this spring we had one unidentified tree. Its gray bark peels and flakes as it grows, leaving smooth, light burnt-orange edging where the bark had been. Its long limbs seem to be reaching out to catch each gentle breeze that passes. Pale green powdered pollen drifts and swirls earthward just before the leaves start to appear. Everything under the tree gets a good dusting. The leaves grow in clusters of alternating jagged edged leaves. It, too, is a deciduous tree like the pecan, but leafs out much earlier and keeps its leaves longer in the fall. I used every tree field guidebook I could find to identify this tree and finally Gerald McDonald, a teacher at Chavez High School, found it on page 565 in his copy of *Trees for Urban and Suburban Landscapes* by Edward F. Gilman. This publication described it as having beautiful, exfoliating bark, variable in color. As I read the description, I knew that I had finally found the tree. This beautiful tree with thin bark, drooping branches, and leaves in clusters of alternating jagged edges finally had a name, Chinese or lacebark elm. Mystery solved. To add to the ambiance in the courtyard, an arch-topped garden bench was placed beneath its spreading limbs so everyone could enjoy the gentle breeze and soft shade.

Our immature trees include sennas (cassia) and two limequats, which are citrus trees. The cassia was planted last summer and is the food source for the cloudless sulphur

butterflies. Having read that the giant swallowtail butterfly larva prefer citrus leaves I went on a quest for the plant (Stokes 49). The Houston Museum of Natural Science butterfly experts recommended the limequats, a variety of citrus, and if they have fruit it will be a bonus.

Along the northern border of the campus and in the neighboring yards are sycamores. They are easy to identify because of their shedding bark that leaves the trunk rather smooth. The trunk is light gray with light green and white blotches on the limbs. It seems to get lighter toward the top of the tree. The sycamore has large light green leaves that are fuzzy on the underside, and sycamore balls. The balls are actually the seedpods. These trees drop their leaves each fall and leaf out early in the spring. Sycamores can grow very large, and unless they are trimmed, their limbs grow quite close to the ground. When we lived by the Illinois River in Northeastern Oklahoma, we would climb up in the sycamore trees along the riverbank and watch the people float by in the canoes. They were quite fun to camp under, too.

My students say that the cypress in winter looks like bare Christmas trees. It does have that very identifiable shape in the winter as well as in the spring with its feathery leaves. The cypresses on campus have one straight trunk with limbs coming out from the main trunk that point out and down just slightly. The limbs get smaller and shorter as they go up the tree. They also have “knees” that are actually roots that grow out of the ground around the tree.

One lonely, rather scraggly mulberry tree hugs the north side of the building. The birds love this one in the spring when it produces its berries. Students have been seen enjoying a berry or two also. It is recommended that they wash the mulberries before they eat them, as sometime there are tiny worms on the fruit. Birds don’t mind the extra treat but kids might. This is one tree that we are trying to protect as it feeds a lot of birds each spring.

On the same side of the school and along the fence is a maple. In the spring the seedpods drop off and spin like a helicopter crashing and digging into the grass. There are quite a few that sprout around the yard but are mowed down before they get a chance to grow up. The seeds collect on the roof of the school, and when the wind kicks up, they are blown from the top of the school into the courtyard too. There would be a lot of these trees if they were left to grow where they sprouted.

In the front of the school, there are three or four different kinds of pine trees. I am not a tree expert, but I do know that one is a long-leaf pine and two are short-leaf pines. Their exact identity will be left to the experts. They litter the ground with pinecones during the year. What the squirrels leave intact, I gather and take into the classroom so the students can study the seedpods. After a few weeks in the cooler classroom, they open and we have plenty of pine tree seeds to check out. One variety does not drop its cones; they open on the tree.

There are six oak trees on the playground, three of which are post oaks. Their acorns are small but plentiful most years. I don't think the squirrels like them. They seem to disappear only when students leave recess with bulging pockets. These oaks are evergreen, but do lose some leaves in the fall. A smaller lacebark elm is also on the playground, and along the fence is an old chinaberry. It has been there so long that it has become part of the chain link fence. A large hole is on one side of the trunk and you can see the fence inside the tree. This chinaberry's trunk has the most interesting shape with artistic bumps, twists, and curves. On our "back 40," my name for the back of the school campus, are three magnificent live oak trees. They have the most wonderful shade for outdoor classes and picnics. There are usually numerous insects on and around these trees and one destination for campus field trips. This is one area in which the students have to watch closely for fire ants, and if they wander to the fence they must avoid the poison oak/ivy.

Closer to the school is a flowering crab. It is outside the room that I occupied for my first five years at Durkee. We called it our "weather or season change indicator." In the spring it was usually covered entirely with pure white flowers. The petals would fall and my first graders would tell me that it was snowing. As spring progressed and the leaves grew, it became a ball of green. We used that tree to tell if it was windy, raining, cloudy, or sunny. When winter approached, the leaves would begin to change just enough to show some color change and gently drop to the ground. We would then wait for the first signs of spring, as that tree would be the first one to bloom. There was only one spring that it was not covered with blooms. That year was the only year that the acorns around the Post Oaks were scarce too. A second flowering crab has been planted just east of this tree and one day it too will become a source of conversation between teacher and students as the seasons change.

When the class goes on the mini-field trip around the school, the students will collect one leaf from each tree and mark on their campus map where the tree is located. The leaves will be pressed in a large book between pieces of paper towel. Students will either draw pictures of the basic shape of the tree or a camera will be available for students to take a picture of the tree with a close up of the bark. One digital camera is all that is needed for the entire class. Having a digital camera that can be connected to the computer will allow the students to print out the pictures and then scan them to make copies for each student's journal. If a camera is not available, the students can download pictures of the trees from the Internet. Students can also use a field guide, such as *Trees of North America*, to identify the trees. During other outdoor class periods, students will use observation to list all other plants they find on campus. This will include all hedges, bushes, or flowers. During the spring students might want to work in small groups to collect one wildflower per group, press the flower, and use a wildflower field guide to identify it. Since technology is available I plan on having the students using cameras as much as possible and using websites for identifications as well.

Once the students have learned the process for identifying trees and plants on campus, they can extend their new expertise to the plants and trees in their yards and the neighborhood park. A field trip to a local nature center such as Jones Park, Mercer Arboretum, or Memorial Park Arboretum will widen the scope of species to be identified. Students who are able to convince their families to go on a nature excursion on the weekend or on school holidays may check out a camera and plaster cast kit. Cameras that are purchased or donated will be utilized to record more than just plants and trees. They can be used to record the wildlife as well. Both students and their parents will be required to attend an after school work shop on the care and use of the camera for photographing plants and animals. They will also be given instructions on how to make a plaster cast of animal prints and given a “kit” to make plaster casts when on their family field trip. All of this will culminate into the end project of a journal complete with drawings or photos of the animals, plants, insects, and any other “wild” inhabitants that have been found. The student will be expected to identify all species they find by using field guides, websites, or adult assistance.

BUTTERFLY HABITAT

A butterfly habitat has been started and will be used as an outdoor classroom for students of all ages. (Lesson C-1: Establishing Rules.) Rules for students and teachers using the outdoor classroom have been established and posted on the two entries to the courtyard.

The rules are: 1. Walk everywhere and look where you walk.

(Caterpillars like to walk in the grass too.)

2. Be quiet as a caterpillar.

(Do not disturb the other inhabitants of the habitat)

3. Do not taste or eat anything.

(Leave the food for the caterpillars and birds)

4. Listen to your teacher and follow directions carefully.

(The animals would appreciate it if you do.)

5. Keep the area clean.

(Even caterpillars like a clean room.)

These rules are for the safety of the students as well as the plants and animals that inhabit the courtyard habitat. Once the rules have been established and the students understand the reason for building a habitat, the teacher will be ready for the planning stage.

Some of the lower elementary classes began work on the butterfly habitat last year. Where once just trees, a few bushes, and grass grew, there is now a working classroom. Most of the soil had not been worked in years. It was tilled by my husband and dug up by first and second grade students, and flowerbeds began emerging. So far we have established eight separate flowerbeds. Once we planted Mexican milkweed we began getting monarch butterflies visiting and laying their eggs. As they hatched I would buy more milkweed plants to feed the hungry munchers. I purchased so many milkweed plants with eggs and caterpillars that Jim and Chip at “The Backyard Gardner” on North Main started calling me the “caterpillar lady.” I needed plants to feed the caterpillars

that were hatching at school and just could not turn down any plant with caterpillars or eggs. Knowing that I take all the caterpillars to school, they have supplied me with Io moth caterpillars, which were eating their redbud tree; woolly bear caterpillars, which were eating their ferns and ivy; cloudless sulphur caterpillars on the cassia tree; and black swallowtail caterpillars on the curly parsley. Not only did I get different caterpillars, I also purchased the plants and added them to our flowerbeds in the butterfly habitat.

As the flower beds increased so did the plant population. Karen Griffith – a first-grade teacher and gardening buddy – and I added a great variety of nectar plants. We have supplied the butterflies with nectar from Mexican milkweed; red salvias; blue salvias; red, pink and white pentas; zinnias; coreopsis; petunias; pansies; lavender provenca; lavender lady; black-eyed Susans; white cone flower; verbenas; yellow lantana; and rainbow lantana. We have royal red, white, Navaho purple and black knight butterfly bushes. Our arch trellises are up and ready for the Dutchman’s pipe vine, yellow jasmine, pink jasmine, passionflower vine, and potato pea vine. As if this were not enough, we went to the Houston Museum of Natural Science’s butterfly plant sale to increase the number of host plants and nectar plants. We came back with 21 new plants: bee balm, red lantana, jatropha, limequats, partridge pea, shrimp plants, coral plants, parsley, dill, fennel, rue, and three more varieties of passionflower vines to make sure we had not left some butterfly homeless and without the food they like. Time will tell if the butterflies agree with our choices.

Students need to choose the area for the flowerbed according to the amount of direct sunlight needed for the plants they have chosen (Lesson C-2: Planning and Planting a Butterfly Habitat). *Stokes Butterfly Book* is an excellent resource to use when deciding which plants to have in a butterfly garden and where they should be planted. They have included a list of the plants and butterfly nectar sources, separated into annuals, perennials, wildflowers, shrubs, trees, and vines, along with the preferred color of each. A separate list for the larva food, primary larva food plants and butterflies that use them is also included (Stokes 14-19). I have referred to this list so many times that I finally had to purchase a second book as the pages were getting torn. When choosing the plants, just remember that it is essential to have plenty of Mexican milkweeds, as the monarch butterfly lays its eggs on the underside of the leaves and the resulting caterpillar devours the leaves as soon as it hatches. Take it from one who has experienced it. An entire bed of milkweed can look like sticks coming out of the ground before the caterpillars go into chrysalis. Like most “weeds,” they do grow new leaves, hopefully in time for the next female to lay her eggs. Milkweed flowers are also a good source of nectar for a large variety of butterflies, including the monarch. In fact, a separate bed just for milkweed might be necessary, as so many butterflies are attracted to it for their nectar. Some milkweed should stay in containers so the monarch caterpillar can be brought into the classroom for closer observation. Also, we will allow some of the plants to go to seed in order to observe how seeds are dispersed and how seedpods are an integral part of nature’s way of replanting. Some seed will be harvested and planted by the students to replenish the milkweed beds the following spring. It does not usually get cold enough

here in South Texas to kill the milkweed, so you may have monarchs the year around. I have had monarch butterflies hatching until late December.

Although monarchs are the most plentiful, a wide variety of butterflies can make the habitat their home if the correct plants are chosen. The eastern black swallowtail and anise swallowtail seek food plants such as fennel, dill, parsley, and rue. The painted lady and common checkers skipper prefer hollyhock. The monarch and queen use the milkweed exclusively as a food plant for their caterpillars. More butterflies prefer the nectar of the milkweed than any other nectar source (Scheck 24-25).

Each year, the students will continue expanding the habitat with the additions of native plants that support the multitude of butterflies and birds that migrate through and live in the area. Vines to attract hummingbirds will be planted along the fence on the south side of the campus. Bush plants that produce food for birds will be planted next to and in front of the vines. This will help make it a more natural setting and attract more birds that make their nests in the vines. Using recommendations from the Texas Wildlife Department will help create a natural habitat. Once native plants are established, they tend to grow better during the hot summer months and need to be watered less often.

According to the experts at the Cockrell Butterfly Center, the top 10 butterflies in Houston are the monarch, Gulf fritillary, black swallowtail, giant swallowtail, pipe-vine swallowtail, Spicebush swallowtail, cloudless sulphur, Texas crescent, long-tailed skipper, tawny emperor, and hackberry emperor. Being able to identify these ten butterflies will be the goal for the first year (Lesson C-3: Identifying Butterflies and their Life Cycle). Additional butterflies can be included as they arrive in the butterfly habitat or at the Houston Museum of Natural Science's Cockrell Butterfly Exhibit.

A monarch, identifiable by its bright orange wings with black veins, seems to float on the breeze as it visits the milkweed to lay its eggs or sip the nectar from the milkweed flowers. The monarch butterfly uses the milkweed exclusive as their host plant and prefers the nectar too. It seems to be the most abundant of all butterflies in Houston and is one of the most visible. When the female lays her eggs on the underside of the milkweed leaves, it only takes three to four days for the egg to hatch. The monarch caterpillar begins as a pale green larva with tiny dark stripes that blend in with the leaves. As it grows, the caterpillar is more visible, with green, black, and yellow stripes. This caterpillar does not have to hide, as it is known by predators that it tastes awful. Eating the milkweed makes it inedible to birds. Milkweed is a poisonous leaf that the caterpillar loves. The caterpillar does not digest the poison; it is stored in its bodily tissues. Monarch caterpillars grow very quickly and pupate within two weeks (Landman 215). The butterfly emerges from the chrysalis in seven to 14 days depending on the outside temperature. When the daily temperature is 90 degrees or above, it only takes seven days. I have found that if you leave the pupae in the air conditioner, they will take longer or not hatch at all.

We added the passion vines for the Gulf fritillary, which were plentiful last summer. They prefer passion vines to lay their eggs, and it is their nectar of choice. It is often observed in flight over the Gulf of Mexico, at some distance from any land. It is one of our most common butterflies, and is also very beautiful. The Gulf fritillary male is bright red-orange, and the female is slightly browner with heavier dark markings. Their wings appear elongated, and they have three black-rimmed white spots near the leading edge of the forewing (Schneck 59). When we spot the first Gulf fritillary, we will start looking for the black or slate-gray larva with orange stripes and black spines on the passionflower vines. Since we have four species of passionflower, perhaps the female will choose at least one as the perfect place to lay her eggs.

After sighting a giant swallowtail investigating the red flowers on the Kalanchoe, we decided to add a citrus tree to our collection. The limequats, being citrus, filled that void. We planted rue for the giant swallowtail too. On my last visit to The Backyard Gardner, I purchased a parsley plant that just happened to have a black swallowtail larva munching on the leaves. It is now a pupa, and when it hatches, it will be released into our butterfly habitat. Hopefully, it will return and lay more eggs on the parsley, fennel, rue, or dill and let the limequat have a chance to get established. The swallowtails that frequent the Houston area are from the family *Papilionidae* and include the pipe-vine swallowtail, zebra swallowtail, black swallowtail, giant swallowtail, tiger swallowtail, spicebush swallowtail, and the Palamedes swallowtail. The pipe-vine swallowtail is one of the most abundant and widespread swallowtails in the Houston area and throughout Southeast Texas. Their larvae feed almost exclusively on pipe vines, sometimes called Dutchman's pipe (Tveten 18- 34). The unique shape of their wings distinguishes swallowtails. They all have extensions on the tail end of their wings (Schneck 33-40). Not all swallowtails like the same plants, however. The snise, black, giant, and eastern black swallowtails like carrot, parsley, fennel, celery, dill and other members of the parsley family. They also like rue. Perhaps with the addition of these plants they will visit, lay eggs, and sip nectar with the other butterflies in the habitat.

Cloudless sulphurs, a giant pale yellow butterfly with wings that are rounded, choose the sennas (cassia) in which to lay its eggs. When they go into the pupa stage, they look like a folded leaf and are quite camouflaged. When I purchased the cassia, it had a few cloudless sulphur caterpillars on it, and the kids were able to see how different their pupa stage was compared to that of the monarch. There are quite a few sulphur butterflies around Houston. Early in the spring they can be seen at Memorial Park in the treetops. The large orange sulphur, little sulphur, and the Mexican yellow prefer the sennas too. Since the common sulphur, orange sulphur, cloudless giant sulphur, and sleepy orange prefer legumes, we are adding those plants later.

The Texas crescent is said to be plentiful in Houston also. The pictures I have seen show a very beautifully shaped butterfly whose wings are dark-brownish black with white spots. The undersides of the wings are reported to be more orange and white. The Texan crescent butterfly has not made an appearance in our butterfly habitat, but we do

have a shrimp plant just in case, and as soon as I find a tube-tongue (Tventen 138), there will be two plants that the Texas crescent prefers as food plants.

Butterfly number nine on the list of the most visible butterflies in Houston is the long-tailed skipper. It has a long hind-wing and looks more like a fake butterfly kite. It is dark brown with light rectangular spots on the forewing. These hind-wings are very fragile, and it is difficult to find a perfect specimen. Unlike most butterflies, the long-tailed skipper has a hairy body and wing base, so it might be mistaken for a moth. This skipper prefers beans for its larva (Tventen 210-211).

The hackberry emperor and tawny emperor both prefer the hackberry tree. The hackberry emperor is olive brown or grayish brown with unique spots that almost look like eyes when viewed from the underside of the wing, and the tawny emperor is orange-brown and has smaller eye-like spots on the hind wing only. I don't recall seeing either one, and unless we plant a hackberry tree, it is very doubtful that we will. They feed on rotting fruit with a passion, so perhaps we can lure some in just to eat overripe pears or peaches. This butterfly also likes to gather at mud puddles, and air conditioners do make some rather nice puddle areas (Tventen 171-176). We have observed monarchs at these "puddles," so perhaps the emperors will enjoy them too.

BIRDS

Although we are concentrating on attracting butterflies to the outdoor classroom with the construction of a butterfly habitat, we will also plant native plants that are recommended in *Your Backyard Wildlife Garden: How to Attract and Identify Wildlife in Your Yard* in order to attract songbirds and hummingbirds. This lesson will use the same strategies as Lesson C-2: Planning and Planting a Butterfly Habitat, but students will be researching to find plants for birds and hummingbirds. Using the book listed above as well as the National Wildlife Federation website will help students to complete the lesson. These plants will be added to the butterfly habitat and to an area along the fence. It will be exciting to see just how many different kinds of butterflies and birds will be observed in our "natural-as-we-can-make-it" habitat.

Bird identification is very important when studying the habitats of wildlife. As with plants and butterflies, the students will learn how to identify birds by using a number of characteristics. Birds can be identified by the shapes of their bodies, the color of their feathers, and the places where they live (Children's Guide to Birdwatching TP7W website) (Lesson D-1: Our Feathered Friends). The Texas Parks and Wildlife Department's website is a wonderful source for beginning bird watchers and for identifying birds. Using a page from Children's Guide to Birdwatching, children can learn what to look for and how to describe what they see. This page also teaches why birds have different beaks and feet.

Birds that they definitely will see on campus almost daily include the mockingbird, eastern starling, boat-tailed grackle, mourning dove, blue jays, killdeer, and sparrows. Occasionally and as the seasons change, there will be cardinals, robins, red-winged blackbirds, downy or red-bellied woodpeckers, Carolina chickadee, tufted titmouse, Carolina wren, and even red-tailed hawks overhead. This spring we had a flock of about 15 to 20 tri-colored blackbirds in our courtyard feeding at the feeders for about three weeks. These blackbirds do not have the typical red patch on the top of their wings when not in flight. A white band was visible when they were on the ground eating the fallen seeds from the bird feeders. Only when they flew did we see the red on their wings. They are slightly smaller than the red-winged blackbird, too. It was a rare sighting as they are found mostly in California. After discussing the sighting with the other members of the seminar, it was suggested that they probably got caught in front of a succession of three strong fronts that came from the west and flew all the way to Texas. Just when I thought they had moved on, a few came back into the courtyard. Perhaps they will stay and become Texans. There were enough of them to start a colony.

The northern mockingbird is perhaps the most common bird on our campus. We marvel at the number of songs that it sings when we are outside. It repeats each song at least three times. It is easy to recognize, too, with its light gray body and long tail with white feathers that seem to be inserted between the gray; furthermore, as it is the state bird, it is studied as part of our social studies curriculum. Its actions are comical at times as it leaps into the air and flutters back down while singing (Kaufman 256). I have observed this very mannerism when a mockingbird was chasing a grasshopper. Practice did pay off as it caught the grasshopper and had a nice meal. We have a number of pairs of mockingbirds nesting in the trees in the courtyard. They chase the squirrels about and are as protective as the bossy blue jay.

The first eastern starlings my students noticed in our courtyard were described as having no tail. They (my students) were almost correct. The eastern starlings' almost tailless appearance along with their short, stubby bodies, dots on their black feathers, and long, thin, yellow beaks distinguish them from the other "black birds" on campus. Plus they have much sweeter songs than some of the others. The eastern starlings nest in the open spaces along the inside the courtyard. They have parts of their nests hanging out, and it is interesting to see what they have gathered for their nests. We have identified green plastic grass, cotton yarn, and lots of dry grass. It will be interesting to see the young starlings when they leave the nests.

The mourning doves are visible most mornings and at different intervals during the day. They sing a series of "coos." As a child my granddad said it was a sign of rain when they sang. The mourning dove is a medium-sized gray bird with a trim body, a lighter gray head, and black spots on the upper wing. They appear to be so calm when feeding on the ground. Their wings make a very distinct ruffling sound when they fly. They have built crude nests in the live oak tree and make daily appearances at the picnic

tables and on the feeders. We also have Mexican doves that are much smaller and more of a solid gray. Both kinds of doves are beautiful.

Recently one of my second graders came in telling the class about all the great big black birds that he saw in the courtyard as he left school. As he began describing them, I realized that this was the first time that he had offered any information about anything. And to think that I might have been the reason he was being observant was thrilling. However, instead of just telling him what kind of bird he had seen, I handed him a bird field guide and asked him to find the bird he had seen. It took about five minutes, and he yelled out "I found it." He was so thrilled that he could identify the bird. Later he asked me if I knew what bird he had been talking about. When I told him that I did he asked how. I just told him that he described the boat-tailed grackle perfectly from its extra long tail to the iridescent blue-black (he said shiny and greenish) feathers. Perhaps he will remember this bird because he was able to identify it himself and he got to tell the rest of the class about all the male boat-tailed grackles he had seen in the habitat. These birds are welcomed to the habitat as they eat a lot of insects.

On occasion we see blue jays hopping about from limb to limb in the big oak tree. These birds are not only big, but very noticeable as well. They are not shy either and will chase other birds and squirrels around if they want the food that is available. These jays are mostly blue (thus their name) but have white patches on their wings and tails. Even their song says their name, "jay, jay, jay," in a very loud manner. When they are nesting in the trees, they have been known to dive-bomb anyone coming too close. Three babies hatched as school ended this year. They were learning to fly and kept hitting the window. Their parents were scolding them, and eventually they flew toward the tree and not toward the building.

There is an open pasture next to the playground, and each spring I see at least one pair of killdeer running up and down the fence. Their tiny legs move so fast, yet it seems so effortless, as if they were actually floating on the ground. Killdeer are very easy to recognize. Their backs are gray and their bellies are white. They have eye patches that look painted-on and two black bands around their neck. They have long, skinny beaks, and their legs look so skinny that one might wonder how they can run so fast.

Last year a pair built their nest on the roof above the computer room. One of their babies fell off, and one parent was trying to coax it back toward the building as the second grade class was coming out to play. I had seen what they do to protect their young, but the kids had not, and they kept telling me that there was a hurt bird by the little tree. The killdeer looked like it had a broken wing and acted so pathetic that the kids just knew it was dying. They wanted to catch it so we could take it to the vet. I told them to try while hiding a smile, and that if they could catch it we would. The killdeer kept dragging that wing half way across the playground and then stopped, looked back at them and flew away. In the mean time I found the baby, wrapped it in a napkin and placed it close to the building. By that time both parents and its siblings were looking on

from the roof. Most killdeer nest on the ground in bare gravel along the river and creek banks in Oklahoma. With the invasion of fire ants here in Texas, it was wise to choose the lofty nesting area.

The most abundant and, I believe, spectacular, are the sparrows. Yes, they may be considered pests because there are so many, but they are sure fun to watch. They fly so fast that it is difficult to keep up with just one, but with so many it doesn't matter. Until I started looking for the specific sparrows that are on our campus, I didn't realize that there were so many different kinds. I think we have chipping sparrows, the ones with the chestnut crown and white eyebrows; field sparrows; and house sparrows. However, they move so fast and look so much alike (and I just have not taken the time to really watch close enough) to see just how many different kinds we do have. Perhaps that can be an adaptation for one lesson plan, to see how many different kinds of sparrows are visiting the campus.

As the seasons change, so does the bird population. We have a great variety of migrating birds that make the open area behind our school one of their feeding grounds. It will be interesting to see just how many different birds can be identified during the school year. With the addition of natural plants that supply food and shelter along the fencerow, perhaps more will make Durkee a stopping place when they are migrating.

Integrating lessons, such as tree identification and bird watching, is a good combination. Any time the class is outside is a good time to bird watch. When researching plants for butterflies, students will find that hummingbirds like some of the same plants. Cardinals love sunflower seeds, and butterflies help pollinate the sunflower as they drink the nectar. Plants and animals have such a keen way of working together to survive and the lessons can be integrated, too.

After all these lessons it may seem that there is not any wildlife left to study. But we do not want to leave out all the other "critters" in our neighborhood. The mammals, insects, reptiles, and all other such critters have to be identified. This will be an enrichment lesson to see just what other animals the students can locate. Once an animal is seen, photographed, or had its footprints saved in plaster, students can use the field guides to identify the animal.

SEASONS AND WEATHER CHANGES

Along with the planting of and caring for the plants, the students will be observing changes in the weather and seasons. Weather changes can be predicted by the change in cloud formations. The effect of shorter days and cooler weather as fall and winter approach will allow students to observe first-hand the changes in plant growth. They will use these observations to help understand how animals instinctively know when to hibernate or migrate. Migration paths will be tracked on class maps, with help of various websites that have been set up specifically for following the migration routes of specified

butterflies and birds. Integrating map skills in these lessons covers part of the required social studies curriculum and will be continuous throughout this unit. Weather, seasons, and map skills will be integrated into the lesson plans and not taught out of context.

LIFE CYCLES

As the students keep a photographic and /or written record of the different kinds of butterflies, birds, and insects that visit the courtyard habitat, they will learn about the life cycle of each animal. (Lesson plans are integrated with identification of each species.) When butterflies are observed around the flowers and milkweed, the students will begin checking for eggs and caterpillars. When the caterpillars are mature, some will be harvested and brought into the classroom to observe the transformation into the pupa stage. This is when we will use the milkweed that was left in a container. There are commercial butterfly cages available, but they are expensive. You can make your own by purchasing an extra-large mesh laundry bag with drawstrings, a wire mesh dome that is used to cover food at picnics, and a pizza pan. Put the pizza pan in the bottom of the bag, set the milkweed on the pizza pan, place the mesh dome inside the bag, and pull the mesh laundry bag up and over the dome. Then, pull the sting tight, put it through the handle on the mesh dome, and you have a butterfly cage that costs \$3.00 plus tax. The money you save can be used to purchase more milkweed plants. When the caterpillars go into chrysalis, they are returned to the courtyard in the mesh bag and will be protected from predators like wasps, which are known to cut the chrysalis open, remove the larva or immature butterfly, and feed it to their young and to lizards, which eat the entire chrysalis (Schneck 17). I lost five monarch chrysalises before I started putting them in the protective cages. When the monarch chrysalises appear black (it is really transparent and the butterfly can be seen through the shell), they are brought back to the classroom where the students observe the butterfly as it hatches. When the butterfly's wings have dried, it is then released in the butterfly habitat to complete the life cycle. Before releasing the monarchs, they will be tagged as part of the Monarch Watch program. All of this classroom work will be compiled into a class notebook for future reference. Each student will receive a copy and add it to their personal notebooks as they gather more evidence of the "quiet neighbors" in our urban neighborhood.

There are numerous websites that have lesson plans and work pages for younger students. One that I recommend is <www.copycatpress.com/images/Monarch1.gif>. It has a shape book called Monarch Magic. It has sentences that are easy to read, it can be colored, and it is easy to make.

HUMAN FOOD SOURCE HABITAT

In addition, one area in our outdoor habitat will be devoted to the one animal that depends on other animals for food (Lesson E). We will denote that garden as the Human Food Source Habitat, and it will contain edible plants and plants that grow food for humans. Our students need to understand that we also depend on plants for food. The

students will plant a variety of vegetables that they will consume upon maturation. The plants in this Human Food Source Habitat will include tomatoes, green peppers, radishes, onions, beans, carrots, and a variety of herbs. During the work in this garden, the students will have hands-on lessons to determine the best time to plant seeds and bedding plants. Natural pollination will be a focal point in this garden and will be compared to the artificial pollination that takes place in green houses. Students will have the opportunity to observe evidence of other insects, including butterflies that are natural pollinators. Pollinators and pollinations will not be an isolated lesson, but will be integrated into all observations of flowering plants. If a butterfly chooses any of the Human Food Sources for its nursery, the students will have to choose between food for humans and food for the baby butterfly. A Human Food Source Habitat will demonstrate that it is necessary to grow our own food, keep it free of pests, harvest it at the proper time, and preserve it for the winter months. Learning that, unlike animals, we can grow our own food, will help reinforce the reason for conserving our natural resources and habitats for our wild and helpless neighbors.

TEACHING STRATEGIES

The entire unit will be a hands-on learning and discovery process that integrates all areas of the curriculum: reading when researching; language arts when writing and journaling; math when measuring the flower beds and calculating how much space we need for each plant; science when deciding when to plant, what to plant, and weather changes; social studies when following the migration routes and learning where we can find the different species of plants and animals; health and safety when applying the rules in the courtyard; and fine arts when drawing and photographing the animals, plants, and insects. All information gathered in this unit will be compiled in a journal or notebook. At the end of the school year, each student will have a complete record of all plants and animals in our neighborhood. It will be a useful tool that will, hopefully, spark the desire to learn more about the world around us.

CLOSING

There is so much I have learned since beginning the butterfly habitat:

- Monarch eggs appear smooth to the naked eye, but under magnification they have ridges.
- Female monarchs will chase each other away from milkweed, each one wanting to be the only one to lay her eggs and insure that her babies have enough to eat.
- I didn't realize that butterflies could fly as fast as they do when chasing each other. They zip in and out of the bushes and zoom across the open areas as fast as most birds.
- Caterpillars eat their way out of their eggs by eating the case and in doing so eats a tiny hole in the leaf. They don't stop eating until they are ready to go into the pupa stage.

- It takes a monarch caterpillar from three to five days to hatch, from seven to 12 days until it is ready to go into the pupa stage, and seven to 12 days until it hatches. The warmer the temperature, the sooner they will hatch.
- Butterflies cannot fly if their wings are wet, but let them dry and they can fly to wondrous heights.
- When the caterpillar is ready for the transformation, it goes on what we have laughingly have called a “walk about.” The caterpillar starts walking until it finds just the right place and then, using its silk, glues itself by its tail to that place. We have found them on the window sills, on ceilings, under milkweed leaves, on crossbars of a trellis, on parsley, and on a chopstick stuck in the planter; they have been found from six inches off the ground to the top of a drain pipe about 12 feet off the ground.
- Some chrysalises do not stay where the caterpillar glues them. When they fall they are put on a soft tissue and most of the time they hatch.
- Most of the butterflies survive, and when one does not, it is truly a sad time.
- It takes just three minutes for the caterpillar to shed its skin and become the pupa and another hour to dry and have the look of a monarch pupa.
- Monarch chrysalises have gold beads and a gold band.
- As the butterfly hatches, it takes less than a minute for it to get out of the chrysalis and over three hours for it to dry its wings and be ready to fly.
- Children will stop everything just to watch a butterfly go into chrysalis or hatch. Everyone gets excited when butterflies are released and the more butterflies that are released, the more excited everyone gets.
- Children and butterflies are a lot alike: from birth to adulthood, they both go through such a wonderful transformation that it is almost miraculous.
- Children believe you can cure crumpled butterfly wings.
- Watching two butterflies mate is not sensual but wonderful nonetheless.
- Watching a butterfly hatch is no less wonderful than seeing a newborn child. They are miracles in motion.
- Monarchs live about a month in the summer but fly over 1500 miles just to be ready to fly another 1500 miles to keep their species alive.

Don't tell me that miracles don't happen. Just look at the monarchs – they are miracles with orange and black wings.

Since beginning the work on this unit, I have begun to look at my neighborhood and the neighborhood around my school differently. I thought I was observant of my surroundings before, but where I once saw overgrowth, I now see inner city habitats just waiting to be developed. I drive down White Oak Drive every Sunday, yet I did not notice the gorgeous bright blue morning glories until this spring. They are all over the shrubs, and I can't wait to gather some seeds and get them growing along our school campus fence.

During a bus trip on our second grade field trip to the Houston Museum of Natural Science, I was preoccupied with thoughts of butterfly and bird habitats. Each vacant lot was a potential wildlife habitat. “Ooohs” and more “oohs” go off as they went whizzing by. Even the area along the interstate where they have planted the trees seemed to be begging for butterfly weed and nectar plants. When we got back someone was mowing the large lot just to the north of our campus, and I wanted to jump off the bus and charge over to stop him. See, I said I was getting carried away. New eyes? Perhaps. I do know that I have had a change in attitude, and soon, so will my students.

Not only has this unit expanded my horizon to new potentials; I have also managed to recruit my husband to butterfly sit. He releases all butterflies that hatch on our front porch nursery when I am at work, he lets me know when our caterpillars are ready to be put in the net cage to go into chrysalis, and he informs me when the monarch are laying eggs. He used to call them worms, now he calls them caterpillars. He keeps the milkweed watered when I am at work, he lets me know when we need more of it, and he takes me to get it. I think he is ready for step two: adding more plants to attract different kinds of butterflies. My husband is my biggest supporter and is now an official “keeper of the butterflies.”

Knowledge brings power, and with that knowledge comes the responsibility to preserve the ecological system in the urban landscape. The ultimate goal of this unit is to give our children the power to make a difference in their world.

Last question: Where do I go to get permission to sow the milkweed seeds where they planted all those trees along Interstate 45? Hmmm!

LESSON PLANS

This entire unit is designed around hands-on activities. Each student has the opportunity to compile a journal or notebook that can be used as a resource for future work in a butterfly habitat or natural habitat for other wildlife in the urban setting. It is strongly encouraged that each student be held responsible for the addition of all material in their personal journal or notebook. Having the resources available can encourage children to continue the process at home or at some time in the future. The vocabulary lists are suggested lists and can be shortened or lengthened for different grade levels or for different content areas. Lessons can be taught as interdisciplinary units and include objectives stated in H.I.S.D. CLEAR.

Lesson A-1: Field Safety

Objective

The objective of this lesson is to teach the children how to identify plants and animals that are harmful to humans.

Materials

Field guide to plants, insects, reptiles and mammals; camera; paper; and pencils.

Vocabulary

Poison ivy or oak, fire ants, black widow spider, irritation, itching, burning sensation, field guide, insects, reptiles, mammals, harmful, and poisonous.

Procedure

First, review the vocabulary with the class. It is important that they know the meaning of each word before class discussion begins. The second step is to establish safety rules before leaving the classroom. Brainstorm with the entire class or have each student write the rules they think are important and then have the class edit the list. The completed list should then be printed and placed in the field journal or notebook. The teacher might want to suggest safety tips such as: “Do not touch or taste anything,” and most importantly: “If you do not know what it is, leave it alone and tell a teacher.” It is important that the students have ownership of the safety rules.

Before leaving for the field trip, show the class pictures of what they will be looking for. Once in the field, locate poison ivy/oak and show the students what it looks like. Take pictures of the plants the students find. Take precautions to ensure that it is not touched or stepped on. The oils from the plant can get on students’ shoes and be transferred to their hands when they tie their shoes or remove them at night. Answer any questions they have about the plant.

Next, locate a fire ant mound. Explain what happens when the ants feel the vibration as they walk close. Use vocabulary they can understand. The “guard” ants gather the “troops” and mass together to defend their home. This explanation is quite sufficient and students can visualize the “army” as the ants rush out. Most students in south Texas have experienced a fire ant bite and are most cautious anyway. It is never correct to assume that every student will leave the ants alone. Take pictures of the undisturbed mound and then very carefully disturb the colony and allow the students to observe the “troops.” More pictures can be taken as the ants come out to guard their home.

Lesson A-2: Close-Up Encounter

Objective

The objective of this lesson is to teach the students how to use a magnifying glass correctly and how to clean it properly.

Materials

Magnifying glass and tissue, camera, bug barn or insect viewer, pencil, and paper.

Vocabulary

Magnify, lens, viewer, focus, enlarge, inspect, and investigate.

Procedure

Start by explaining that each student or pair of students will be allowed to use a science tool and that magnifying glasses are not toys. Demonstrate how to hold the magnifying glass so your fingers are not on the lens. Hold the magnifying glass by the handle and place a leaf in your hand or hold it with your fingers. Move the magnifying glass to focus and enlarge the leaf. This makes it easier to focus and keep the leaf from becoming a blur. Explain how they are to use the bug barn or insect viewer in addition to the magnifying glass. Give each student a magnifying glass and tissue in a plastic bag. When they have practiced, go outside and let them find any object to look at through the lens. If they can find a bug, they can put it in the bug barn or insect viewer and get a better look, as it will not be crawling off.

Once they have completed the investigation process and have shown that they can focus in on the insect or other object, they can use the tissue to clean the lens. Just remind them that the lens is similar to the lens in glasses and to put the lens between the tissue and their finger and rub gently in a circular motion. When the lens is clean, both the lens and the tissue can be put back in the plastic bag and returned to the science tool kit.

After this lesson is complete, the students can add a copy of the instructions on how to use a magnifying glass to their journal or notebook.

Lesson B: I Spy, I See a _____ Tree***Objective***

The objective of this lesson is to learn how to identify a tree using the leaves, bark, and shape of the tree as resources when using the tree field guide.

Materials

Tree field guides, 1-quart baggies, paper towels cut in quarters, camera, map of school campus, paper, and pencil.

Vocabulary

Leaf, leaves, bark, trunk, limb, lobes, alternating, opposing, deciduous, evergreen, knees, edges, scientific name, common name, species, families, fruit, vine, shrub, tree, flowers, twigs, and buds.

Procedure

Allow students to browse a tree field guide to get familiar how the field guide describes trees and with the descriptive word. Once in the field the students will write a brief description of the tree, draw a picture of its basic shape, and take a photograph of the tree and a close-up of the bark. Students will collect one leaf from each tree on the school campus. They will record the location of the tree on the campus map, which has been supplied. Trees will be numbered, and paper towel quarters will be numbered to match

the tree. As the leaf is collected, they will put the leaf between the two pieces of towel that match the number of the tree. After each student has collected a leaf from each tree, return to the classroom. They can begin the identification process using the field guides. If the identification cannot be completed, a second field trip will be necessary to use the photograph of the tree and the bark. The leaves will be pressed in a book, allowed to dry for a few days, removed, glued on 1/2-sheet size copy paper, labeled with the tree name and number, laminated, and put together as a personal tree field guide. They will also complete the campus map by writing the name of the trees on the map, matching tree number with tree number. The completed map will be added to their journal or notebook.

Enrichment

Use web search to identify trees. Students are to collect leaves from trees not on campus, bring them to school for identification, and add them to their tree field guide.

Lesson C-1: Establishing Habitat Rules

Objective

The objective of this lesson is to write the rules everyone is to follow when they enter the butterfly habitat and post the rules on the entrance to the habitat.

Materials

Paper, pencils, crayons, poster board, and markers.

Vocabulary:

Habitat, animals, humans, source, safety, care, conservation, re-build, and protect.

Procedure

Students will need to brainstorm the topic. Explain that, just as in the classroom, school rules are necessary to keep everyone and everything safe and that rules are needed to keep the habitat safe for the animals and plants that live there. Discuss what rules are necessary to protect the plants and animals and explain how students are expected to use the habitat as an outdoor classroom.

Write the list and then edit it. Once the students have established what they consider the best rules, publish them so everyone will know what is expected when they enter the habitat.

We have our habitat rules displayed, in English and Spanish, on the doors leading to the habitat, and although they are from our classroom, they can be adapted to each group that uses the outdoor classroom. If the posted rules are not exactly as your class chose, then discuss the posted rules as well as those your class chose. Students will include a copy of the habitat rules in their journals or notebooks.

Enrichment

Students can decorate a poster to go on the entrance to the habitat or compose a letter to other students explaining why the rules are necessary. An oral presentation to another class, explaining the rules and why they are necessary, would be another way that students convey the rules to others.

Lesson C-2: Planning and Planting a Butterfly Habitat

Objective

The objectives of this lesson are to plan a butterfly habitat by researching the plants necessary to attract butterflies and feed their larva and to plant the plants in areas where they will grow best.

Materials

Part 1: Research books such as: *Stokes Butterfly Book: Butterflies: How to Identify and Attract Them to Your Garden*, by Donald Stokes, Lillian Stokes, and Ernest Williams, *Your Backyard Wildlife Garden: How to Attract and Identify Wildlife in Your Yard*, by Marcus Schneck; or similar books; camera; paper; pencils; measuring tools; stakes; and yarn or small cord.

Part 2: Measuring tools (tape measurer, yardstick, meter stick), trowels, shovels, rakes, garden gloves, plants, seeds, trash bags, and water.

Vocabulary

Garden tools, habitat, vines, plants, shrubs, trees, yardstick, tape, rake, hoe, stakes, trowel, shovel, plant, seeds, cutting, propagation, trellis, and observation.

Procedure

Part 1: Once you have decided to plant a butterfly habitat, the first step is to make all the necessary preparations to make it easier for you, the teacher, and more fun for you and the students. Good planning is essential.

The first part of this lesson in planning the habitat is selecting the plants that you want in the garden. Using the books mentioned above, or similar references, the students can determine what plants would be beneficial for attracting and feeding butterflies. After a list has been made, the next step is to choose where the plants will be planted. The location will be determined by the area you have and the needs of the plants selected. Beds will be measured, staked off, and marked with yarn or small cord. Placement of each plant will be marked on the drawings of each bed. Students will have to know how much room each plant needs, how tall the plants will get, and what color the flowers will be. Knowing the colors is necessary just to keep someone from planting the same color in one bed.

Students will make a drawing of the habitat, where each bed is to be located, and what plants will be in the beds. They will then check the master list to see if the butterflies that they want to attract have the correct plants. For the younger students the teacher may want to have a drawing ready and then just fill in the site for each plant on their list. A “cut and paste” worksheet would be appropriate during this part of the lesson.

There are garden plans available in *Your Backyard Wildlife Garden: How to Attract and Identify Wildlife in Your Yard*, by Marcus Schneck or you may have books with similar garden plans that will help identify the methods that can be used to complete your plans. Allowing the students to choose without showing them formal plans makes it more interesting and makes the outcome more varied. When the students have a preconceived idea, it sometimes conflicts with their creativity.

When we were planting our first flowerbed, I just told the children to dig a hole, put the flowers in, and put the dirt back in around the flowers. They chose where they wanted to plant the flowers, how close they should be, and it turned out just beautifully. Now that we are planting to establish a butterfly garden, I still have that one flowerbed where the students are allowed to add any plant they choose, anyplace they want to plant it. The only restriction is that it has to be inside the bedding area.

Part 2: The second part of planning is of course planting. The soil is prepared by tilling or turning it with a shovel and then raking it smooth. If additional soil is added, it too needs to be tilled or turned with a shovel before the planting process is started. Have the supply of plants and seeds on-site and ready to plant. Students will dig a hole for each plant, remove it from the container, and place it in the ground. An adult supervisor may have to help at this point, if the plant is very large, and when the soil is being replaced around the plants. Seeds are planted at this time also. Each plant or planting of seeds should be in the approximate area shown on the garden plans. Allow the students to do the majority of the digging and planting.

Students will include the map of the habitat in their journal or notebook and write a short paragraph explaining what they did when planning and planting in the habitat. This gives them ownership of the habitat and a sense of accomplishment.

Lesson C-3: Butterflies and their Life Cycle

Objective

The objective of this lesson is to learn how to identify butterflies using a field guide, binoculars, and other butterfly books to help in the process.

Materials

Field guide on butterflies, binoculars (at least three or four pair), camera, an assortment of books with pictures of butterflies, paper, and pencils.

Vocabulary

Species, fore wing, hind wing, compound eye, antennae, abdomen, tarsus, hind leg, thorax, proboscis, middle leg, foreleg, caterpillar, larva, pupa, chrysalis, transformation, metamorphosis, crawls free, emergence, hemolymph (insect blood), frass, silk, and adult, mating. (Additional vocabulary is available in the field guides if you need it.)

Procedure

Collect photographs of different butterflies that can be found in the field guide, and have the students locate them in the field guide. Then give a description of a butterfly and let the students find it in the field guide. Go outside and see if there are butterflies in the habitat and if there are use the field guide to identify the butterflies. Hopefully the butterflies will fly in at the precise time you are in the habitat. (It could happen.) Make a list of the butterflies that are found in the area. Use a website to find pictures of those butterflies or locate them in the field guide. Draw and label the parts of a butterfly. Color the butterfly according to the kind it is. Draw and label the life cycle of a butterfly. Color the illustration. Add the colored illustration of the life cycle of the butterfly to the journal or notebook.

Lesson D-1: Our Feathered Friends

Objective

The objective of this lesson is to learn how to identify birds using a field guide, binoculars, and other books about birds.

Materials

Field guides, binoculars, camera, a list of common birds, paper, and pencils.

Vocabulary

Binoculars, field glasses (refer to the field guides as to how the following vocabulary will apply and how it is used to identify birds), plumage, tail, wing, beak, color, size, shape, bill, throat, breast, posture.

Procedure

Browse through the field guides. Read the introduction and instructions on how to use the book, how the information is presented, and what the symbols mean. Once the students understand how to use the field guide, take a field trip on campus and make a list of all the birds that are identified using the field guide. You might even cast some birdseed out to see if you can attract birds at this time. If you have a bird feeder in the habitat, students will need to be very quiet and still. If birds are far away, use binoculars to help identify them. Write the description of each bird that has been seen. Photograph all the birds that you see that are close enough to reach with the camera. When you return to the room, it is useful if the students use the information in the field guides to complete the identification process. Make a list of all birds that are seen on campus. The next step is to go to a local bird sanctuary or wildlife park to find more species of birds.

When the students have a list of birds they have identified they are to use that information to make their own checklist of birds in the neighborhood.

Enrichment

Students can use the same process to identify birds they see when not on campus. They can also record songs of the birds they hear and use these recordings to identify the birds they hear but have not been able to locate to identify. Songbirds are easily recognized by the songs they sing. Further study can be made to identify birds by their wing beats, profile, and flight patterns.

ANNOTATED BIBLIOGRAPHY

Works Cited

- Kaufman, Kenn. *Birds of North America*. New York: Houghton Mifflin Company, 2000.
A field guide to identifying birds that has color-coded sections according to the type of bird. Includes range maps and basic birding instructions.
- Landman, Wijbren. *The Complete Encyclopedia of Butterflies*. Hackberry Press, 2001.
Describes the development and lifecycle of butterflies and moths from around the world. Contains actual photographs.
- Parts of a Bird*. 2004. Texas Parks and Wildlife. 1 May 2004. <www.tpwd.state.tx.us/adv/birding/beginbird/birdpart.htm>.
Diagrams of a bird, in color, with labels for beginning bird watchers.
- Schneck, Marcus. *Butterflies, How to Identify and Attract Them to Your Garden*. Edison: Chartwell Books, Inc., 2001.
Teacher resource used to identify butterflies, caterpillars, capture in photographs, raise butterflies, collect and safely release them.
- Stokes, Donald, Lillian Stokes, and Ernest Williams. *Stokes Butterfly Book*. Boston: Little, Brown and Co., 1991.
The complete guide to butterfly gardening, identification, and behavior with photographs and drawings. Excellent book for beginning butterfly gardeners.
- Tventen, John and Gloria Tventen. *Butterflies of Houston & Southeast Texas*. Austin: U of Texas P, 1996.
Photographic guide to butterflies that inhabit Houston and the surrounding area of Texas.
- Quote From Our Native Past*. 1996. StoneE Productions. 1 May 2004.
<<http://www.ilhawaii.net/~stony/quotes.html>>.
I was looking for the quote I placed at the beginning of my paper and found this website. It is quite interesting to learn where of the quote that I have heard all my life comes from.

Teacher Resources and Field Guide

- Brockman, Frank C. *Trees of North America*. New York: St. Martin's Press, 2001.
Field guide to the major native and introduced species north of Mexico.
- Day, John A. and Vincent J. Schaefer. *Peterson First Guide to Clouds and Weather*. Boston: Houghton Mifflin, 1991.

- A concise field guide to the atmosphere with actual photographs.
- Forey, Pamela and Cecilia Fitzsimons. *Instant Guide to Wildflowers*. New York: Gramercy Books, 1986.
Field guide to the most familiar species of North American wildflowers, described and illustrated in full color.
- Groom, Dale. *Dale Groom's Texas Gardening Guide*. Nashville: Cool Spring Press, 2003.
Excellent resource for determining the correct plants to plant, when to plant, and how to care for the plants.
- Ham, Hal. *South Texas Wildflowers*. Kingsville: Texas A&I University, 1984.
A casual guide for identifying some of the wildflowers in South Texas.
- Lehr, Paul E., Will Burnett, and Herbert Zim. *Weather*. N.Y.: St. Martin's Press, 1993.
Field guide with full color illustrations and up-to-date facts to help understand what weather is all about and how weather changes are predicted.
- Loughmiller, Campbell and Lynn Loughmiller. *Texas Wildflowers, A Field Guide*. Austin: University of Texas Press, 1989.
A field guide with actual pictures of the wildflowers.
- Martin, Alexander C. *Weeds*. New York: St. Martin's Press, 1987.
A Golden Guide for identifying weeds.
- Mitchell, Robert T and Herbert Zim. *Butterflies and Moths: A Guide to the More Common American Species*. New York: St. Martin's Press, 2002.
A field guide for identifying 423 North American species.
- Robbins, Chandler, Bertel Bruun, and Herbert Zim. *Birds of North America*. New York: St. Martin's Press. 2001.
Excellent field guide for identifying birds of North America.
- Schneck, Marcus. *Your Backyard Wildlife Garden, How to Attract and Identify Wildlife in Your Yard*. Edison: Chartwell Book, Inc., 2001.
Super resource to help create a natural garden with native plants that appeal to wildlife and a comprehensive visual identification guide to backyard insects and animals.
- Tventen, John and Gloria Tventen. *Wildflowers of Houston*. Houston: Rice University Press, 1993.
Photographic guide to Houston area wildflowers.

- Wright, Amy Bartlett. *Peterson First Guide to Caterpillars of North America*. Boston: Houghton Mifflin Company, 1993.
A concise field guide to 120 common caterpillars of North America and the moths or butterflies they finally become.
- Zim, Herbert S. and Clarence Cottam. *Insects: A Guide to Familiar American Insects*. New York: St. Martin's Press, 2001.
A field guide to identify familiar insects.
- Zim, Herbert S. and Ira N. Gabrielson. *Birds, A Guide to Familiar Birds*. New York: St. Martin's Press, 2001.
Smaller-size Golden Guide with 129 of the most familiar varieties.
- Zim, Herbert S. and Hobart M. Smith. *Reptiles and Amphibians*. New York: St. Martin's Press, 2001.
Field guide for identification of snakes, frogs, turtles, and salamanders.

Student Resources

- Feltwell, John. *Butterflies and Moths*. New York: DK Publishing, Inc. 1997.
Eyewitness Explorer's publication. Includes things to make and do as well as how to observe and record.
- Freeman, Darlene and Mike Maydak. *Butterflies*. New York: McClanahan Book Company, Inc., 1999.
Easy-reading book all about butterflies.
- Gibbon, Gail. *Monarch Butterfly*. New York: Scholastic, Inc. 1989.
Easy-reading story of the life cycle and migration patterns of the monarch.
- Norsgaard, E. Jaediker. *Butterflies for Kids*. Minnetonka: NorthWord Press, 1998.
Wildlife for Kids Series, recommended and approved by Ranger Rick of the National Wildlife Federation. A combination of photographs and drawings of the butterfly's story.
- Sandved, Kjell G. *The Butterfly Alphabet*. New York: Scholastic, 1996.
Microscopic pictures of hidden letters and numbers in butterfly wings.
- Turnbull, Stephanie. *Caterpillars and Butterflies*. Tulsa: EDC Publishing, 2002.
Usborne Beginners Book to teach children about the differences between butterflies and caterpillars and their life cycles.
- White, Nancy. *Butterfly Battle*. New York: Scholastic, 2003.

The Magic School Bus series chapter book. Story about children turning into butterflies and learning first-hand about their life.

Websites

Aggie Horticulture. 2004. Texas A&M Horticulture Program. 1 May 2004. <<http://aggie-horticulture.tamu.edu>>.

Listings of all trees in Texas with pictures and a brief description. Excellent site to help identify trees.

Entomology. 2004. Texas A&M University Department of Entomology. 1 May 2004. <<http://insects.tamu.edu>>.

Go to search to locate the specific topic.

Monarch Magic. 2002. Copycat Press, Inc. 1 May 2004. <www.copycatpress.com/-images/Monarch1.gif>.

Pages that can be downloaded, printed, and used in the classroom.

Monarchs. 2004 Texas Parks and Wildlife. 1 May 2004. <www.tpwd.state.tx.us/factsheets/insects/monarch/.htm>.

Fact sheets on the monarch butterfly.

NSF. 2004. NSF International. 1 May 2004. <www.nsf.org>.

Informational site dealing with various topics on a variety of wildlife.

Schoolyard Habitats. 1996-2004. National Wildlife Federation. 1 May 2004. <www.nwf.org/schoolyardhabitats/creatinghabitatsites.cfm>.

Specific information regarding creating a schoolyard habitat.

Waterford Press. 1998-2003. Waterford Press Inc. 1 May 2004. <www.waterfordpress.com>.

Free games, activities, and more.