

Audubon at School

A Schoolyard Habitat Curriculum Guide



Grades 1-4

comprehensive lessons in science and conservation on school grounds or in new schoolyard wildlife habitats
you will find two to three lesson plans for each grade level with vocabulary words, resources, background information and extension activity suggestions.





Dear Teacher,

The goal of this curriculum guide is to help educators provide their students with comprehensive lessons in science and conservation that take advantage of natural elements on school grounds or in new schoolyard wildlife habitats. With decades of teaching experience in the field and in the classroom, Audubon Connecticut staff created this guide to complement the U.S. Fish and Wildlife Service (USFWS) Schoolyard Habitat Program and Project Guide (<http://www.fws.gov/eno/pdf/HabitatGuideColor.pdf>). The USFWS Schoolyard Habitat Project Guide focuses on the technical elements of designing and implementing a wildlife habitat in schoolyards. Used together, these guides will support your efforts to foster a love of learning and provide high quality, hands-on educational experiences for your students.

This guide contains suggestions on how you can use Audubon outdoor-based activities to substitute for and/or supplement lessons you are currently doing in your classroom via your Science Pacing Guide. In the following pages, you will find two to three lesson plans for each grade level, with vocabulary words, resources, background information, and extension activity suggestions. In the introductory pages, you will find information about Audubon and the U.S. Fish and Wildlife Service, and tips and ideas on how to successfully bring your classroom outdoors.

The materials in this guide are designed to directly correlate with Connecticut Science Standards for the first through fourth grades. The activities in this guide are multi-disciplinary to help you integrate your science units with other subjects taught in the classroom, including math, science, conservation, language arts, history, and art.

Many schools have green spaces and outdoor areas that can serve as “living classrooms.” Your schoolyard may already provide habitat for common birds, but by improving the quality of that habitat, you will attract additional birds and wildlife while providing a healthier, more interactive environment for students, their families, and staff. Numerous studies have demonstrated the positive impacts of schoolyard habitats on student achievement, physical activity, physical and mental health, behavior, and attitudes towards nature and the outdoors.

We hope you find these materials useful and educational for both you and your students. If you have any comments or suggestions on this guide, we would appreciate your feedback. Please feel free to contact Audubon with your thoughts and ideas at 203.869.5272 x224 or x230.

Sincerely,

The Staff of Audubon Connecticut

Credits



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Disney Worldwide Conservation Fund

Fairfield County Community Foundation

Long Island Sound Study

U.S. Fish and Wildlife Service



1830 Foundation



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About the Project Partners

National Audubon Society

The mission of the National Audubon Society is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity.

For more than a century, Audubon has built a legacy of conservation success by mobilizing the strength of its network of members, Chapters, Audubon Centers, state offices, and dedicated professional staff to connect people with nature and empower them to protect it.

Audubon integrates science, education, and policy expertise to achieve its conservation goals, from the protection and restoration of local habitats to the implementation of policies that safeguard birds, other wildlife, and the resources that sustain us all—in the U.S. and across the western hemisphere.



To learn more about the National Audubon Society, please visit our website at: www.audubon.org.

Audubon Connecticut



Audubon Connecticut, an operating unit of the National Audubon Society, implements the Audubon mission within the state, protecting birds, other wildlife, and their habitats through education, research, advocacy, and land preservation. Through our network of nature education centers and sanctuaries throughout the state, Audubon Connecticut protects 4,500 acres of land; provides dynamic education programs designed to connect people of all ages with nature; and delivers top-quality nature education to thousands of schoolchildren each year.

To learn more about Audubon Connecticut and its centers and chapters, please visit our website at: www.audubonct.org.

U.S. Fish and Wildlife Service



The mission of the U.S. Fish and Wildlife Service (USFWS) is to work with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. USFWS is a leader and trusted partner in fish and wildlife conservation, known for scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service.

Through the Schoolyard Habitat Program, the USFWS works to connect children with nature by helping teachers and students create wildlife habitat on their school grounds.

Typical projects include wetlands, meadows, forests, and variations based on specific eco-regions. Many projects are planned through multiple phases and change over time as children from various classes build upon the existing work of past students. Schoolyard Habitat projects give every student a chance to observe, learn from, and experience nature.

To learn more about the US Fish and Wildlife Service, please visit their website at: <http://www.fws.gov>.



The Long Island Sound Study

The Long Island Sound Study (LISS) works with federal, state, and local partners to restore and protect Long Island Sound. The program’s goals include protecting water quality and restoring wildlife habitat within the Long Island Sound area. Habitat restoration on school grounds in the Long Island Sound Study area benefits the Sound and species that live in and around this area by providing habitat, reducing pollution like runoff and creating opportunities for school communities to connect with their local environment.

To learn more about the Long Island Sound Study, please visit their website at: <http://longislandsoundstudy.net>.



Audubon at Home

Individual Action, Collective Impact

A healthy environment for birds, other wildlife, and our families does not depend on public policy and professional conservation work alone. Individual action and lifestyle choices can add up to enormous collective impact—in homes, schoolyards, and communities. That is why Audubon At Home strives to empower individuals to live more sustainably, providing the guidance, resources, and tools they need to honor our natural heritage and ensure a healthy, vibrant world for generations to come.

Healthy Habitats for Birds and People

Bird populations, including some of our most familiar and beloved species, are in decline throughout the United States. Loss of habitat is one of the most pernicious threat facing birds. With an estimated 2.0 million acres of land converted to residential use each year, our schoolyards, town parks, beaches, and backyards are the only potential refuges for a vast array of wildlife. How we manage and care for these remaining green spaces—the habitats we protect, the plants we grow, the forms of pest control we apply, the amount of water we use, and the products we buy—can have a significant impact on our native plants and wildlife, and on the health of our communities.

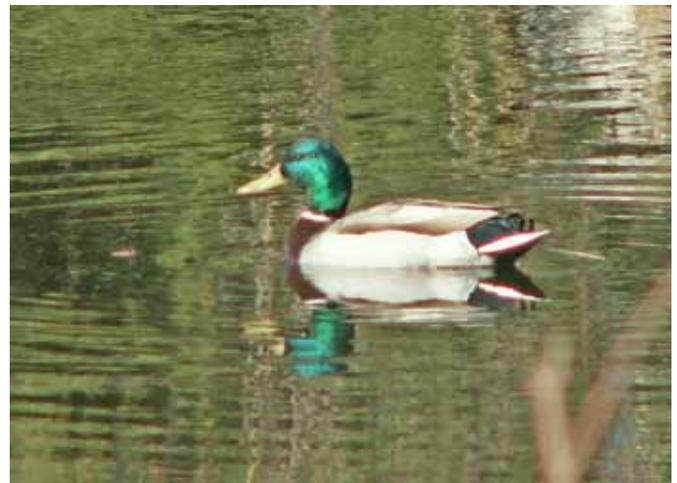
Audubon At Home's five basic principles—conserve water, protect water quality, reduce pesticide use, plant natives, remove exotic invasive species—deliver big benefits for birds and people alike.

Audubon At Home Objectives

Conserve Water

Billions of gallons of water are used daily in the United States. A large share of domestic water is dedicated to household uses, such as washing clothes and dishes, taking showers, and watering lawns and gardens. Learning to conserve water now will help protect this finite resource in the future.

Creating a schoolyard habitat featuring low maintenance native plants, trees and shrubs, and reducing large open lawn areas, can decrease the amount of water used on grounds, while providing valuable habitat for wildlife.



male Mallard

Visit the Environmental Protection Agency's site, 'Water Conservation Tips for Schools':
http://www.epa.gov/region1/eco/drinkwater/water_conservation_schools.html.

Protect Water Quality

We each contribute to water pollution in some way. Runoff from streets, parking lots, and other impervious surfaces contains pollutants, motor oil, and debris. Runoff from yards and lawns is filled with pesticides, fertilizers, and even pet waste. Ultimately, this runoff (also known as non-point source pollution) makes its way to Long Island Sound, a major source of recreation and economic activity for Connecticut residents, and critical habitat for birds, fish, and other aquatic wildlife.

Visit the Long Island Sound Study site, which has a section on resources for teaching about water quality and the Long Island Sound: <http://longislandsoundstudy.net/get-involved/teaching-resources>.

Eliminate or Reduce Pesticide Use

Overuse of pesticides and other household chemicals can have detrimental effects on environmental and public health. The vast majority of pesticides are toxic to organisms beyond the targeted pests. Whenever we use insecticides (for insect control), herbicides (for weed control), fungicides (for fungus control), rodenticides (for rodent control), or other pesticides, we potentially expose birds, beneficial organisms, pets, and people to risk. Pesticide use is rampant in this country—homeowners apply millions of pounds of insecticides, herbicides, and fungicides per year to their homes, lawns, and gardens (not including applications made by pest control and lawn care professionals). According to the National Audubon Society, an estimated seven million birds die each year because of exposure to lawn pesticides. Children and pets are at particular risk of exposure due to their smaller body size, time spent playing outdoors, and tendency to put objects in their mouth. Links have been found between pesticide exposure in children and a range of health issues, include:

- Attention-Deficit/Hyperactivity Disorder
- Childhood Brain Cancer
- Developmental Delays
- Autism Spectrum Disorders
- Endocrine Disruptions
- Birth Defects



male Northern Cardinal

Many people are unaware of the risks posed by many household and garden products. Be an informed consumer and choose to use these products less frequently and more carefully to protect your family and backyard wildlife. Consider eliminating your use of chemical pesticides and fertilizers on your lawn and garden.

In 2005, Connecticut became the first state to ban synthetic weed killers around schools (grade K-8) and day-care centers (Public Act 05-252). Schoolyards can serve as excellent models for organic lawn care practices.

Plant Native Species

A native plant is one that occurs naturally in a particular habitat, ecosystem, or region without human introduction. It is well adapted to that region's soil, moisture, and weather conditions. The consensus among experts is that plants occurring naturally in North America prior to the arrival of European settlement are considered native.

Native plants are crucial to native wildlife. They have evolved together to provide certain benefits to each other, such as food and shelter in exchange for seed dispersal and pollination. Native plants provide food and shelter for 10-15 times more species of birds, butterflies, and other local wildlife than non-native plants.

Using native plants in your landscaping will save you time and money. Since native plants are adapted to local soil and moisture conditions, they require less water. Once established, they are usually low maintenance. They have natural defenses to, and can better resist, pest infestations without the application of harmful pesticides and fertilizers. There is a wide variety of native plants that you can use in any type of landscape, including your schoolyard habitats.



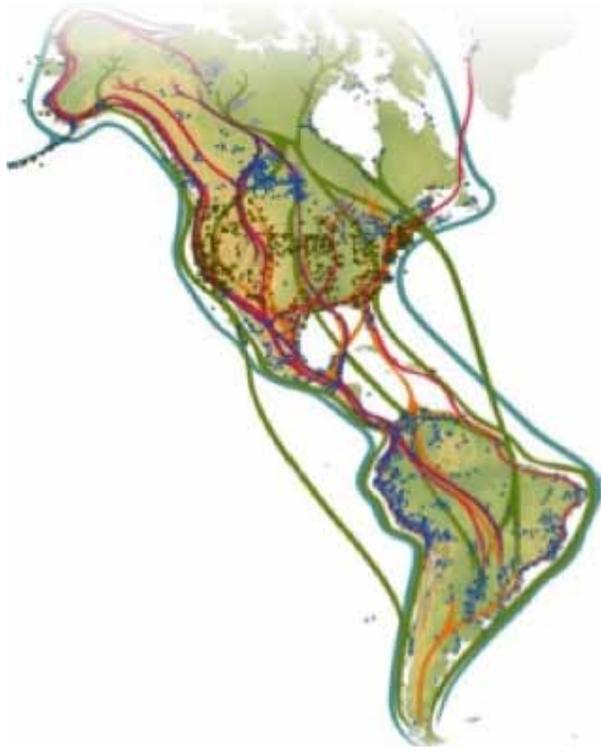
Remove Exotic Invasive Plants

Invasive plants are non-native plants that cause environmental or economic harm to a region. They can alter the way plants, animals, water, and soil interact within native ecosystems. Removing invasive plants is time consuming and costly. Avoid using invasive plants and learn more about the most common invasive plants in Connecticut.

Attracting Birds to Your School

Audubon believes that healthy communities don't just happen—we make them happen. For more than a century, Audubon has worked in communities across the U.S. and abroad to connect people to nature and empower them to make a difference, for the benefit of birds, biodiversity, and human health.

Audubon encourages people to ask themselves: where does my home, workplace, or local park fit into the larger ecosystem? How can I make it healthier and more environmentally friendly for humans and birds alike?



The Atlantic flyway—a major migratory route stretching all along the Eastern Seaboard—is traversed by tens of millions of songbirds twice each year.

The Atlantic flyway—a major migratory route stretching all along the Eastern Seaboard—is traversed by tens of millions of birds twice each year. To make these remarkable journeys, birds require places to rest and refuel along the way. These transcontinental journeys are challenging for the hardest of birds, and the challenges multiply as vast areas of natural habitat along migration pathways are altered or eliminated. The forests, shrublands, and coastal habitats of the Eastern Seaboard are steadily giving way to development, making it difficult for exhausted birds to find suitable places to rest and refuel.

Birds need help. Recent studies have shown that migrating birds experience the highest mortality—up to 15 times higher—during migration than during any other time in their annual cycle. Predation, collisions with buildings, and limited food resources at stopover sites all contribute to the challenges birds experience during migration. Many migrating songbirds that fail to find sufficient food at stopover sites die before completing their journey. Those that do arrive at their breeding and wintering grounds often arrive late and in poor condition, and are forced to select poorer quality habitats, resulting in decreased nesting success and rates of survival.

To survive and thrive, migratory birds need a protected network of stopover sites all along their migratory pathway. In this rapidly changing landscape, our parks, gardens, and backyards serve as valuable habitat oases for hungry migrants. By applying management and landscaping practices that provide high quality habitat and food for migrating birds and other wildlife, our urban green spaces and remnant forests may serve as important stepping stones for birds along their journeys.

The needs of birds are not much different from our own. Food and water are essential, as is shelter from the elements and a safe place to raise a family. Provide these fundamental elements in your backyard habitat, and you will attract numerous visitors.

Native vegetation is critical to providing for the basic needs of food and shelter for migrating birds. Studies have shown that bird species of regional conservation concern are eight times more abundant and significantly more diverse on habitats dominated by native plants. Native landscaping positively influences the bird and butterfly populations in suburban neighborhoods, and provides a mechanism for reducing biodiversity losses in human-dominated landscapes.

FOOD

Many backyard birds are insect eaters, but will supplement their diet with nuts, seeds, fruit, or nectar, when available. By increasing the array of foods you offer, you will increase the diversity of birds you will attract and support. By selecting trees, shrubs, and ground covers that provide seeds, fruits, buds, or nectar, the wildlife gardener can create habitat that offers a rich, long-term source of food for dozens of wildlife species.

The best way to feed birds is to provide natural food sources and supplemental birdseed feeders with each changing season. Many backyard birds are year-round residents in most parts of the United States. However, far more birds are migratory, creating a constant change of visitors to your grounds. In the spring, plant insect attracting species such as Oaks, Hickories, Elms, Willow, Highbush Blueberry, and Speckled Alder for hungry migrants. In the summer, fuel over-worked parents with sugar-filled fruits such as Red Mulberry, Black Cherry, Highbush Blueberry, Serviceberry, or Elderberry. In the fall, birds will seek out fat-heavy fruits such as Black Gum/Tupelo, Sassafras, Flowering Dogwood, Silky Dogwood, and Spicebush to fuel long-distance flights south. In winter, tough fruits that withstand harsh weather and can fill cold bellies such as American Holly, Winterberry Holly, and Inkberry will help birds survive into spring.



Black-capped Chickadee

WATER

All birds need water for drinking and bathing. By providing a clean, fresh source, you will attract more species to your schoolyard. Water sources may include natural features such as ponds, lakes, rivers, springs, oceans, and wetlands, or human-made features such as birdbaths, puddling areas for butterflies, installed ponds, or rain gardens.



American Goldfinches

The easiest water source to install in your garden is a bird bath. Be sure to change the water 2-3 times per week during warm weather when mosquitoes are breeding, so that any eggs laid in the water don't have time to hatch. If you live in a climate with cold winters, consider buying a small heater available at wild bird feeding stores to keep the water from freezing.

NESTING



male Eastern Bluebird

Birds will remain in your habitat during the breeding season if they have places to nest and raise young. Different species have different requirements. Some nest in cavities, many others in open nests found on ledges or in a tree crotch, and others nest on the ground. Learn which species are likely to nest in your area and provide the appropriate habitat or structure. For more information on nest boxes visit:

<http://www.birds.cornell.edu/nestinginfo/nestboxref/nestboxref>

<http://www.fws.gov/migratorybirds/NewReportsPublications/pamphlet/house.html>

SHELTER

Birds need places where they can hide from predators and inclement weather. Trees, shrubs, meadows, and even rock walls provide such shelter. Native vegetation is a perfect cover for terrestrial wildlife. Shrubs, thickets, and brush piles provide great hiding places within their bushy leaves and thorns. Dead trees provide a home to a wide variety of wildlife, including some that use tree cavities and branches for nesting and perching. In fact, many natural features that provide shelter also serve as places to raise young. Creating a wildlife habitat is about creating a place for the entire life cycle of a species to occur, from tadpole to frog, from caterpillar to butterfly.



The enhancement of your outdoor environment will not be achieved overnight. Approach the project in steps and with patience. Think of it as you would your wardrobe. You would not throw out all your clothes and accessories every year and start anew each season. Rather, you continually replace and add new items over time. In your yard, each action you take will improve the health and wealth of your habitat.

To keep birds coming back to your schoolyard habitat, just remember to provide them with three essential elements: the right variety of native food and quality seed, a source of fresh water for drinking and bathing, and ample cover, preferably provided by native plants.

Audubon At Home Resources

SCHOOLYARD HABITATS

USFWS Schoolyard Habitat Project Guide: <http://www.fws.gov/cno/pdf/HabitatGuideColor.pdf>

USFWS Schoolyard Habitats, Northeast Region: <http://www.fws.gov/chesapeakebay/schoolyd.html>

Boston Schoolyard Initiative (<http://www.schoolyards.org/edu.resources.html>) has practical tips on using schoolyards for teaching and increasing their biodiversity for a richer teaching environment.

Eco Schools: http://www.ecoschools.com/Wildlife/Wildlife_wSidebar.html

The National Wildlife Federation's (NWF) website (<http://www.nwf.org/>) has webinars you can view on designing and maintaining schoolyard habitats, as well as a list of organizations to which you may apply for funding.

NWF has an online How-to-Guide for Schoolyard Habitats, which guides you, step by step, through the envisioning process to continued success. Find out how to get started at:

<http://www.nwf.org/Get-Outside/Outdoor-Activities/Garden-for-Wildlife/Schoolyard-Habitats.aspx>

Audubon Adventures is Audubon's award-winning environmental education program that can be implemented in any classroom or after-school program. By linking content to the common core standards for language arts and science, Audubon Adventures helps teachers and students alike. Find out how to get started at: <http://education.audubon.org/audubon-adventures>

No Child Left Inside Initiatives

The national "No Child Left Inside" website has great information on "nature deficit disorder" and the value and importance of environmental education.

CT DEEP has a great website dedicated to "No Child Left Inside" in CT: <http://www.ct.gov/ncli/>

CITIZEN SCIENCE

Audubon, in alliance with Toyota, has created a TogetherGreen website (<http://www.togethergreen.org>) with a wealth of information about volunteer activities, a daily action center, a quiz to determine your "Eco personality," and other fun activities in which you can involve your school. There is also information on grants and an environmental fellows program.

NWF has a citizen science initiative called Wildlife Watch (<http://www.nwf.org/wildlifewatch/>) where you can enter data on the wildlife you observe in your backyard or schoolyard. As of December 2012, CT has no entries! Be the first!

Project Feeder Watch operated by the Cornell Lab of Ornithology (CLO) is a winter-long survey of birds that visit feeders at backyards, nature centers, community areas, and other locales in North America. Feeder Watchers periodically count the birds they see at their feeders from November through early April and submit their

counts to Project Feeder Watch. The data help scientists track broad scale movements of winter bird populations and long-term trends in bird distribution and abundance.

Find out how to get involved at: <http://www.birds.cornell.edu/pfw/>

CLO also has a Nest Watch (<http://nestwatch.org>) program that uses information from web cams placed in nests to collect data on breeding birds. Free to participate.

Books

Attracting Native Pollinators. The Xerces Society.

The Audubon Society Guide to Attracting Birds: Creating Natural Habitats for Properties Large and Small. Stephen W. Kress.

Bringing Nature Home. Doug Tallamy.

Last Child in the Woods. Richard Louv.

The Wildlife Gardener's Guide. Brooklyn Botanic Garden.

Compost Stew: An A to Z Recipe for the Earth. Mary McKenna Kiddals and Ashley Wolff.

WEBSITES

GENERAL

<http://www.plantanative.com>

<http://www.ecosystemgardening.com>

<http://www.ct-botanical-society.org/garden>

<http://www.sustainable-gardening.com/how-to/wildlife>

<http://www.xerces.org>

CT Department of Energy and Environmental Protection: <http://www.ct.gov/deep>

Audubon At Home: Audubon Connecticut: <http://ct.audubon.org/audubon-home-8>

PLANTS

Native Plant Database (Lady Bird Johnson Wildflower Center): <http://www.wildflower.org/plants>

CT Northeast Organic Farming Association (CT NOFA): <http://www.organiclandcare.net>

Rodale Organic Gardening: <http://www.organicgardening.com>

Native Plants and Wildlife Gardens: <http://nativeplantwildlifegarden.com>

Ecosystem Gardening: www.ecosystemgardening.com

Bringing Nature Home: www.plantnative.com

Pollinator Partnership: <http://pollinator.org>

WATER

Save the Sound and CT Fund for the Environment: <http://reducerunoff.org>

Long Island Sound Study: <http://longislandsoundstudy.net>

Bringing Your Classroom Outdoors

Programs at Audubon Greenwich, Sharon, and Bent of the River are designed to connect people with nature and teach them how to take direct conservation action to benefit birds and other wildlife. Participants in our programs, young and old alike, learn by doing. We teach by engaging our audiences in active participation. Rather than telling participants how something works, feels, and smells, they actually experience it for themselves. We develop our programs based on the most accurate and current science information available and strive to make science both fun and relevant to people's lives (How does this affect me? Why should I be concerned about losing this bird forever?). Ultimately, our programs give people the information they need to make informed decisions about how they interact with nature. Through education, public policy, and science, we hope to build a culture of conservation and environmental stewardship today and in the future.

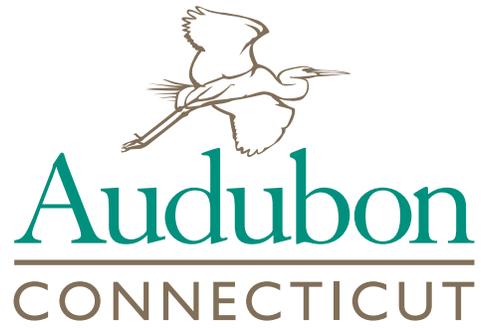


How do children benefit from nature-based education and why do they need green spaces?

- **Active Exercises:** Allows activities such as running, jumping, climbing, and rolling while participating in educational games and/or modeling movements of living creatures in their habitats. Children also develop physical skills like balance, coordination, and judgment.
- **Risk Management:** Children learn to encounter and deal with a range of risks that they can control. Some examples include: learning where to put their feet while walking on uneven terrain; coping with falls; learning how to balance while standing on a rock; looking before touching stems with thorns and how to unhook them from clothing.
- **Social Interaction:** Green spaces can be a place where children can go with their friends, family, and peers. It can also be a place where they meet new people and interact 'socially' with animals.
- **Diversity:** The diversity of the natural world can help teach children tolerance and understanding toward things that are unfamiliar or unknown to them, or that are different from themselves.
- **Sense of Self:** Exploring nature can help a child think of themselves as learners, explorers, and even teachers. They can also develop a sense of independence while exploring on their own.
- **Exploration and Informational Learning:** As children explore, they learn their way around the world around them, whether it be a park, schoolyard, neighborhood, or forest. They begin to recognize the names of plants and animals, catch and release certain animals, and investigate wildlife and habitats close up. Being outside encourages hands-on investigation and stimulates curiosity while learning about the natural world.

Tips for Working with Children Outdoors

1. Be enthusiastic and model respect. If you are excited to go outside and explore, so will your students. Gather your students together and show them an object to get them excited and thinking about going outside. Always demonstrate respect for the natural world to set a good example. Walk the talk!
2. Scout your site and have a plan. Walk around your site in the morning or the day before to plan your route, identify obstacles or challenges, and scout out good places to conduct an activity or play a game. Before you go outside, give your students a brief overview of what they will be doing outside. Some students may not feel as comfortable outdoors as others may, and knowing where they are going and what they will be focusing on can get them mentally prepared to step out of their element.
3. Be prepared. Check the weather forecast the day before and in the morning prior to your activity. Always bring a small first aid kit with you. Expect boo-boos while exploring the outdoors. Have a bag of tricks ready in case a game or activity falls apart. Bring small items that do not take up a lot of space in your bag (blindfolds, paint color chips, colored toothpicks, magic search circles, etc.).
4. Set guidelines before going outside. Ask students what rules they think the group should follow while exploring nature. If you are going to a place with trails, ask them to stay on the trail unless told otherwise. Avoid picking plants unless you are going to use them for a craft or activity. Leave pinecones, rocks, and feathers where they are (after up-close investigation, of course). Stress the idea of being quiet and moving slowly (unless playing a game that involves running) so students do not scare away the animals.
5. Respect fears and discuss them. Help students understand that not everyone (perhaps including yourself) is comfortable around certain animals such as snakes or insects. Often, learning about or becoming familiar with these critters takes away some of the fear.
6. Don't be afraid to say 'I Don't Know.' The outdoors is a continuous learning experience even for longtime naturalists. Challenge students to figure out the name of an organism either by making up a name for it (If you were the first scientist to discover this creature, what would you call it?) or researching the organism with the entire class. Look it up in a book or visit an online resource. If it is an insect, study it with your student or class. (How many legs does it have? What color is it? How is it moving? Where is it spending its time?).
7. Critter safety. If students are collecting animals in containers, be sure they are collected carefully and returned to where they were found. Release ceremonies are appropriate and the entire class can participate.
8. Be ready for unexpected and wondrous experiences! The best part of your outdoor classroom is the chance for spontaneous opportunities for learning that will arise each day. A hawk alighting on a nearby tree. A woodpecker's rat-a-tat-tat. The discovery of a well-camouflaged moth on the trunk of a tree. A dew-covered spider's web sparkling like diamonds in the sunlight. These and the innumerable other experiences that only nature can provide will fill your lessons with excitement and discovery.



Grade 1



Insects

Insects - Standards

Life Science Standards: Students will demonstrate how organisms are structured to ensure efficiency and survival.

Inquiry Standards: Students should demonstrate how scientific knowledge is created and communicated.

Insects Vocabulary

Below is a list of vocabulary words from your *“Science & Technology for Children: Teacher’s Guide to Insects”* that you may want to use with your students while conducting Audubon lessons. You may also want to consider using the short list of additional terms.

Abdomen: The last of three body parts on an insect, after the head and thorax.

Adult: A fully-grown insect.

Air: A mixture of gases that we breathe.

Antennae: Long, skinny movable feelers on an insect’s head that help with touching, hearing and smelling.

Dead: Not living.

Dropping: Insect waste.

Egg: A rounded, usually hard-shelled reproductive body from which organisms hatch.

Exoskeleton: The hard covering on the outside of an insect that provides support and protection.

Food: Anything that organisms eat that provides energy and allows them to grow.

Head: The first body part of insect, which includes the eyes, mouth and antennae.

Larva(e): The newly hatched, wingless, often wormlike form of many insects before metamorphosis.

Leg: The body part that a person or animal stands and walks on.

Life Cycle: The stages of development of an insect from egg to adult.

Living: Alive; having life; not dead.

Molt: To shed.

Pupa(e): An insect at the stage of metamorphosis between a larva and an adult, sometimes in a cocoon and changing its body form.

Segment: One of the parts into which a whole is divided.

Space: One of the things mealworms need to live and grow.

Thorax: The middle body part of an insect between the head and the abdomen. Legs and wings grow from the thorax.

Water: A clear liquid made of hydrogen and oxygen. One of things mealworms need to live and grow.

Wing: The moveable appendage that birds or other animals use to fly.

ADDITIONAL TERMS:

Arachnid: Invertebrates such as spiders, ticks, mites and scorpions that have eight legs and two body parts. Arachnids are often confused with insects.

Caterpillar: The larva form of a butterfly or moth.

Chrysalis: An insect at the stage of changing from larva to adult, during which it is inactive and encased in a hard cocoon.

Cocoon: The protective covering constructed of silk fibers with which a caterpillar or other insect larva encloses itself during its transition to an adult state.

Graph: A diagram used to show the relationship between things.

Habitat: A place where something lives.

Insect: An invertebrate that has three body parts, six legs and an exoskeleton.

Invertebrates: Animals that do not have a backbone.

Metamorphosis: The complete change in appearance of an insect within its life cycle.

Nectar: The sweet liquid in flowers that attracts insects to help with pollination.

Nymph: The immature larva form of some insects, such as dragonflies, that resembles the adult.

Pollen: A powdery substance made by flowering plants that helps with reproduction.

Pollinate: To transfer pollen from flower to flower to help with plant reproduction.

Insect Resources

BOOKS & FIELD GUIDES

Backyard Books: Are you a Spider? Also: Are you a Ladybug? an Ant? a Bee? a Butterfly? a Dragonfly? a Snail? A Grasshopper? Judy Allen and Tudor Humphries.

Backyard Buddies: Cricketology. Michael Elsohn Ross.

Also: Caterpillarology, Millipedeology, Rolypolyology, Snailology, Spiderology, and Wormology.

Big Book of Bugs. Theresa Greenaway.

Eyewitness Books: Insect. Lawrence Mound.

Field Guide to Insects of North America. Kenn Kaufman and Eric R. Eaton.

Golden Field Guides: Insects. George K. Reid.

Also: Birds, Pond Life, Spiders & their Relatives, Trees, Reptiles & Amphibians, and Mammals.

Insect Guides: Amazing Bugs. Miranda Macquity.

The Magic School Bus Inside a Beehive. Joanne Cole.

National Audubon Society Pocket Guide to Insects and Spiders. John Farrand, Jr.

National Audubon Society First Field Guide to Insects. Christina Wilson.

Nature Up-close: A Ladybug's Life. John Himmelman.

Also: A Salamander's Life, A Slug's Life, An Earthworm's Life, A Mouse's Life, A Wood Frog's Life,

A Dandelion's Life, and A Monarch's Life.

One Small Square Series: Woods. Donald M. Silver.

Also: *Backyard, Seashore, Swamp, and Pond*

Peterson First Guide to Caterpillars of North America. Roger Tory Peterson.

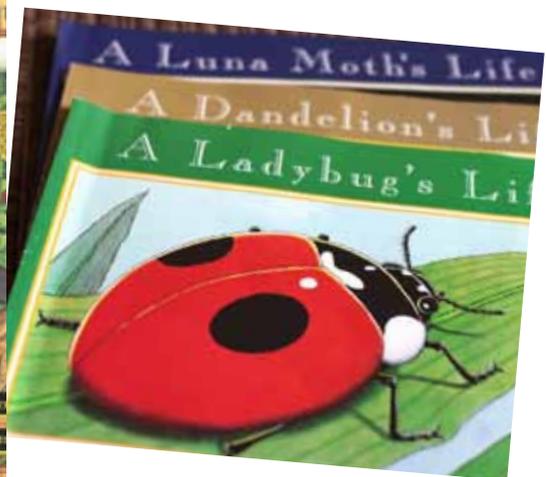
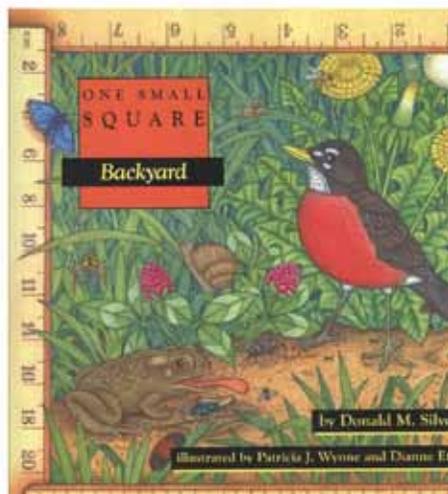
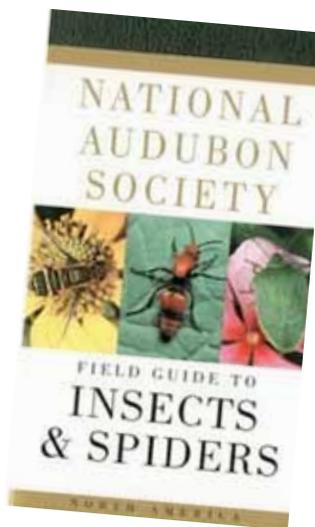
Starting Life Series: Ladybug. Claire Llewellyn and Simon Mendez.

Stokes Guide to Observing Insect Lives. Donald Stokes.

Usborne First Nature: Creepy Crawlies. Cathy Kilpatrick.

Trees, Birds, Wild Animals, Butterflies and Moths, Flowers, and Fishes. Llewellyn, Claire.

The Best Book of Bugs. Kingfisher, 1998.



Where Butterflies Grow. Joanne Ryder and Lynne Cherry.

WEB RESOURCES

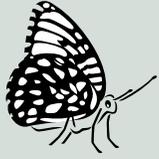
FOSS Web: www.fossweb.com

BugGuide.Net: www.bugguide.net

The North American Butterfly Association: www.NABA.org

Monarch Watch: www.monarchwatch.org

Journey North: <http://www.learner.org/jnorth>



Activity I: Investigating Insects



Level: Grade I

Pacing Guide / Science Standard:

Silkworm Observation Period (early May) and go out another time in late May

Subjects:

Science, Language Arts, Math, and Art

Material List:

Hand lenses,
Bug boxes or plastic jars,
Paint brushes,
Popsicle stick,
Insect Graphing sheet,
My Favorite Insect sheet

Optional Materials:

Insect Search Sheet
Field guides
Large plastic pretzel or animal crackers containers
Sweep nets,
White shower curtains (*for a longer, more detailed outdoor investigation*)

Time Considerations:

30-45 minutes

Objective: Students will search for insects at different life cycle stages in the schoolyard.

Background Information: Share these interesting insect facts with your students to get them excited about the world of insects. Insects live all over the world, even in Antarctica! Because of their small size, insects can live in places many other animals cannot. Although some insects can cause harm to people, trees, or crops, a greater number of insects are very beneficial to humans. Many insects eat pests that destroy crops; many pollinate flowers that produce food crops and help with decomposition; and some supply us with food such as honey and with silk and other materials used to make clothing. Some people and other animals eat insects, too! Over a million different species of insects have been identified on Earth so far! Insects go through different stages in their life, known as the life cycle.

An important part of learning about insects is understanding the **changes** they make during their lifetime as they grow, mature, and die in developmental stages called a **life cycle**. Most insects go through four unique **stages** of life—**egg, larva, pupa, and adult**—to make a *complete* life cycle. Some insects like butterflies, ladybugs and ants go through complete metamorphosis. In the larval stage, many insects live in different **habitats** and eat different food than the adults do. Some insects go through **incomplete** or simple **metamorphosis** with three distinct stages—**egg, nymph, and adult**. Insects going through incomplete changes hatch out of an egg as a nymph and look just like a smaller version of their adult self. For example, grasshoppers and dragonflies go through incomplete metamorphosis.

Activity:

1. Review what makes an insect different from other animals.
2. Review two different life cycle stages: complete and incomplete to help students understand that they will be finding insects at all different parts of their lives (egg, larva, adult, etc.).
3. Ask students where they might find insects living outside (and specifically, in their schoolyard).
4. Visit one of the areas in the schoolyard where students think insects live and model searching and collecting an insect for students.
5. **Conservation & Safety Tips:** Insects should be collected carefully to protect both the insect and the student (from those that may sting).

or bite). When moving an insect into their container, advise students to carefully use a paintbrush. Model the collection process before handing out materials and starting the activity. This will ensure that students will fully understand how to safely collect animals. Always make sure to put rocks, logs, and leaves back where students found them to model respect for the animals living in these places.

6. Divide students into pairs.
7. Hand out materials: bug boxes or plastic jars, paint brushes, two popsicle sticks per student with name, and hand lenses to each student or group depending on how many materials you have available.
8. Show students the insect search boundaries and give students a time limit.
9. Students should search for all types of insects (on trees, shrubs, flowers, bushes, leaf litter, fallen logs, and ground) safely collecting one or two and circling those critters found on their search sheets.
10. Upon collecting their insect, have students write their name on a popsicle stick and put it in the soil to remember where they found it.
11. At the end of the allotted amount of time, bring students together outside or in the classroom to share their insect with their peers.
12. Have students share their discoveries and interesting observations.
13. Hand out Insect Graphing sheet to each student and ask students to raise their hand when they hear the name of their insect called and write down the total. Have students complete the bar graph. You can also make a larger version of the graph and have students volunteer to add their results to the graph.
14. Release insects back to the same location in which they were found (have students find their Popsicle stick(s) within 24 hours of collection).



Extensions:

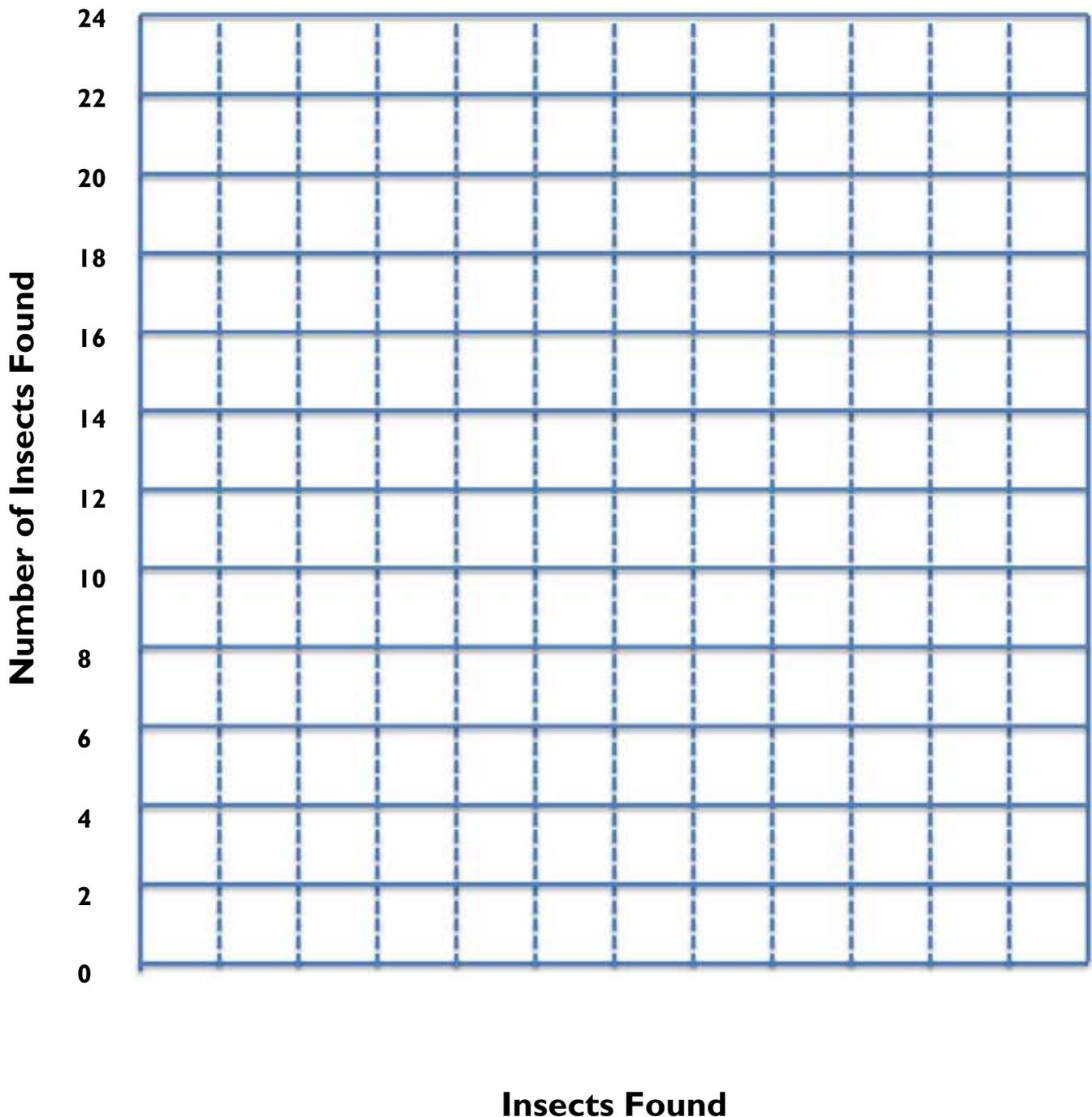
- For homework or in class, have students complete the 'My Favorite Insect' sheet based on one of the insects they found in the schoolyard. To avoid taking insects home, have students draw and name their insect before leaving school so they can answer the remaining questions for homework. Students will need a field guide to insects (or access to BugGuide.net) to complete this activity.
- Have students share what they learned with their peers and post their sheets around the classroom, hallway, or media center. Or put all of the sheets together and make a class insect field guide.
- For homework or during another class session, hand out the 'Insect Search Sheet' and give students time to explore the schoolyard and circle what they have found. After the search, read aloud each insect name and ask students to raise their hand if they found the insect in the schoolyard. Students can complete the Insect Graphing sheet based on the class totals or how many their team found (if you want to split students into pairs or threes).
- Have students create a poem or a storyboard about one of the insects they found in the schoolyard.

Insect Graphing

Your Name: _____ Date: _____

Directions: You will need the 'Insect Search Sheet' from your schoolyard habitat investigation to complete this activity. Write the name of each insect on or above the bar that shows how many your team or class found. Using the sheet, draw a bar graph showing the total number of each insect your team or class found.

Bar Chart of Insects Found in Schoolyard





My Favorite Insect: Part I



Your Name: _____ Date: _____

1. Draw your insect in the box below:

2. Insect name: _____

3. Life cycle stage (circle one): Adult Nymph Larva

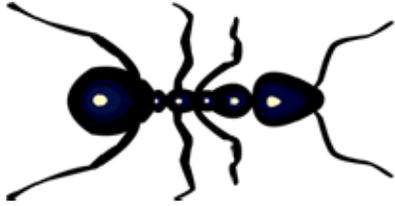
4. Where did you find your insect?

5. What does your insect eat?

6. What might eat your insect?

Insect Search

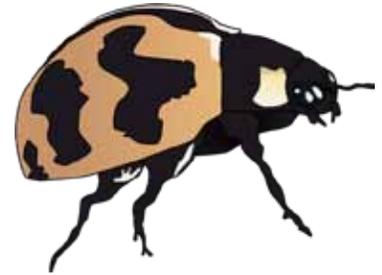
Circle insects found in the schoolyard.
Use the wild card box to create a list of additional insects (and their relatives).



Ant



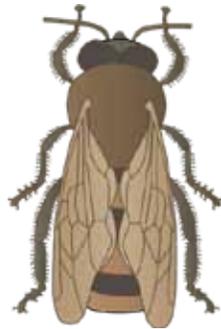
Wild Card



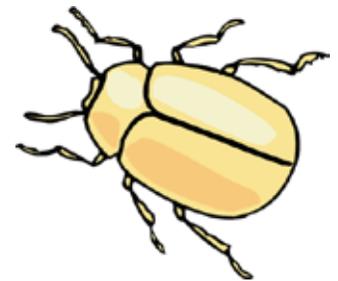
Lady Bug



Butterfly



Bee



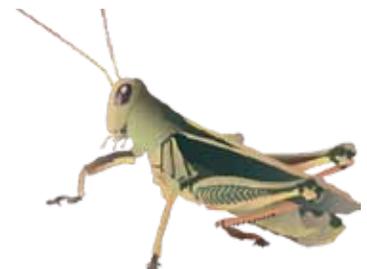
Beetle



Dragonfly



Caterpillar



Grasshopper

Activity 2: Surviving the Schoolyard



Level: Grade 1

**Pacing Guide / Science
Insertion Standard:**

Milkweed Bug Investigation 3
and Butterflies Investigation 5

Subjects:

Science, Language Arts, Social
Studies, and Art

Material List:

Insect Lives Search Sheet
Clipboard
Pencils

Objective: Students will determine if their schoolyard attracts and supports a variety of insects.

Background Information: For an animal to survive, it must have the right kinds and amounts of food, water, shelter, and space (also known as resources). Each type of animal needs particular foods that it can eat and places where it can find shelter from the weather or hide from predators. As long as an animal can find these resources, it can stay in an area. If it cannot find these resources, the animal must leave or it will die. To support a wide variety of animal life, a natural area needs a wide variety of natural foods. These could include a variety of trees, shrubs, vines, grasses, and flowers for plant-eating animals (herbivores) like insects. These animals, in turn, can provide food to larger animals such as hawks, owls, fox, and coyotes. As more and more natural areas are developed, it becomes harder and harder for wildlife to find habitats with the right types and amounts of the resources they need. School grounds can provide the needed resources for wildlife and students can be detectives to find these resources and wildlife managers to help improve the supplies of these resources for wildlife by adding new plantings to provide food and shelter.

ACTIVITY:

1. Ask students what the word habitat means? A habitat is a place where an animal can find everything (resources) it needs to survive and raise young.
2. Next, ask students what all living things (including insects) need to survive. Food, shelter, water and space.
3. Discuss where insects might find what they need outside (and specifically, in their schoolyard). Forests, ponds, rivers, meadows and more specifically, under logs and rocks, on flowers, in the mud, flying through the air, etc. Show students pictures of ponds, meadows, forests, rivers, and gardens.
4. Discuss with students what might happen if we removed some or all of these necessary things from an insect's habitat. Insects would die or move away.
5. Tell students that they will be using a search sheet to look for a variety of things (resources) insects need to survive in the schoolyard.
6. Ask them what kinds of things they will be looking for. Food and water sources, homes, evidence of predators, and places to hide.
7. Show students the insect lives search boundaries and give students a time limit.

8. Divide students into pairs or threes.
9. Hand out materials: Insect Lives Search Sheet, clipboards and pencils, and hand lenses.
10. Bring students back to the classroom and have them share their discoveries about what they found and what they didn't find. Make a list of what students found and what they didn't find and discuss what they could add to their schoolyard to make it a better place for insects and other wildlife.



EXTENSIONS:

- Start a butterfly garden in your schoolyard. To find out more information on starting a butterfly garden in your schoolyard, visit the Connecticut Department of Energy and Environmental Protection (DEEP) at: <http://www.ct.gov/dep/site/default.asp> and search 'butterfly gardens.' Also visit National Audubon Society's Audubon at Home page at: www.audubon.org and click on 'Education'.
- Be a Butterfly Scientist. Help students solve some monarch mysteries and be citizen scientist by observing, recording, and reporting information about monarchs. Sign up at these websites to get started:
- Monarch Watch Tagging Program – <http://monarchwatch.org/tagmig/tag.htm>
- Journey North's Monarch Butterfly Migration Tracking Project – [http:// learner.org/jnorth/monarch](http://learner.org/jnorth/monarch)
- Monarch Larva Monitoring Project – <http://mlmp.org>
- Southwest Monarch Study Tagging Program – <http://swmonarchs.org/tagging.php>
- Monarch Alert California Tagging Project – <http://calpoly.edu/~bio/Monarchs>



AUDUBON ACTION:

- Dragonflies and damselflies hatch and grow in water. They return to water as adults to mate and lay eggs. Some kinds of dragonflies and damselflies depend on water that doesn't move, like in a pond. Other kinds of dragonflies and damselflies lay eggs in moving water, like a stream. Where could dragonflies and damselflies lay eggs in your area? As a class, look on a map of your town, city, county, or state and see if you can find some of the places listed on your Audubon Action sheet.
- After looking for places where dragonflies and damselflies live, hand out DRAGONS, DAMSELS, AND YOU and read it as a class before sending it home with students to share with their families.

Insect Lives Search

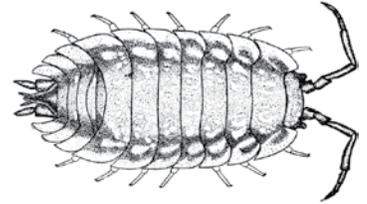
Circle insects found in the schoolyard.
Use the wild card box to create a list of additional insects (and their relatives).



Insect Damage



Wild Card



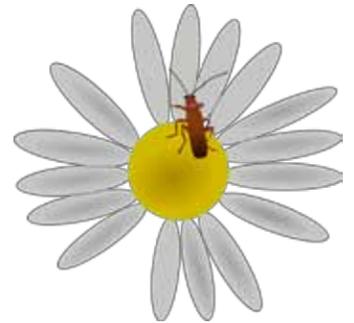
Insect Relative



Water Source



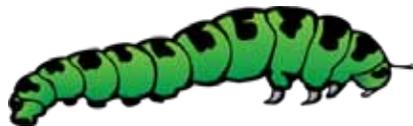
Camouflage



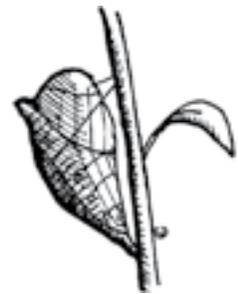
Insect Food



Insect Predator



Insect Larva



Insect Home



AUDUBON ACTION



Dragonflies and damselflies hatch and grow in water. They return to water as adults to mate and lay eggs. Some kinds of dragonflies and damselflies depend on water that doesn't move, like in a pond. Other kinds of dragonflies and damselflies lay eggs in moving water, like a stream. Where could dragonflies and damselflies lay eggs in your area? As a class, look on a map of your town, city, county, or state and see if you can find some of the places below.

1 Can you find a pond? Write its name here: _____

2 Can you find a lake? Write its name here: _____

3 Can you find a brook? Write its name here: _____

4 Can you find a swamp or marsh? Write its name here: _____

5 Can you find a river? Write its name here: _____

DRAGONS, DAMSELS, AND YOU! You can help keep places healthy for dragonflies and damselflies even if you don't live next to a pond, stream, or lake. The small choices you make every day can make a big difference when many people make them!

- Learn about ways to keep insect pests out of yards and parks without using pesticides. Pesticides are chemicals that people spray on plants like vegetables and fruits to keep insects and other pests from eating them. Pesticides can wash into ponds and streams and hurt young (nymphs) damselflies and dragonflies. Use your information to write (and draw pictures) a book you can share with your family and other people in your community.
- Walk gently at the edges of ponds and streams. That's where young (nymphs) dragonflies and damselflies go to shed their skins when they become adults.
- Turn off and unplug lights, TVs, and other things in your home that need electricity to run when you are not using them. Power plants that make electricity also make pollution, so saving energy means a little less pollution added to the air and water.



Grade 2



Plant Growth and Development

Plant Growth & Development - Standards

Life Science Standard: Structure and Function – Students will demonstrate how organisms are structured to ensure efficiency and survival.

Inquiry Standard: Students should demonstrate how scientific knowledge is created and communicated.

Plant Growth & Development Vocabulary

Here is a list of vocabulary words from your “Science & Technology for Children: Teacher’s Guide to Plant Growth & Development” that you may want to use with your students while conducting Audubon lessons. You may also want to consider using the short list of additional terms.

Abdomen: The part of the insect’s body that is on the end opposite from the head.

Alike: Acting or looking the same.

Anther: The part of the stamen that produces pollen.

Bee: An insect that helps move pollen from one flower to another.

Bud: A small new growth at the tip or side of a plant stem that develops into a flower, a leaf, or a shoot.

Centimeter (cm): A unit of length in the metric system. 2.5 centimeters equal one inch.

Chlorophyll: A substance in plants that absorbs light and uses its energy to make food. Chlorophyll gives green plants their color.

Communicate: To share information and ideas through speaking, writing, or drawing.

Compare: To look at two or more things to see how they are alike or different.

Cross-pollination: The process by which pollen is carried from the male part of a flower to the female part of another flower.

Data: Information, such as that gathered during an experiment.

Describe: To use words to explain how something looks, feels, or acts.

Different: Not the same.

Dormancy: A period of rest or inactivity.

Fertilization: The process that occurs when pollen reaches the egg in the ovary of a plant. Fertilization usually results in the formation of a seed.

Flower: The reproductive organ of a plant.

Germination: The process by which seeds swell up, begin to sprout, and develop stem and roots.

Growth spurt: A time when growth is particularly rapid.

Guess: To give an idea about something when you are not sure.

Investigate: To study something closely and in an organized way.

Leaf: A flat, green part of plant; usually grows off the stem.

Length: The distance from one end of something to the other.

Life cycle: The stages that an organism goes through from the time of its formation to its death.

Measure: To determine the length, size, or weight of something.

Nectar: A sweet liquid made by certain flowers.

Observe: To use your senses to study something closely.

Ovary: The part of the pistil in which seeds are formed.

Ovule: A part of the flower that is found inside the ovary. If the ovule is fertilized, it becomes a seed.

Pattern: A repeating arrangement of shapes, colors, numbers, or other things.

Petal: A brightly colored part of a flower.

Photosynthesis: The process by which green plants, in the presence of light, make food out of carbon dioxide and water.

Pistil: The female part of the flower that consists of the stigma, style, and ovary.

Plant: A living thing. Plants usually have roots and cannot move from place to place. They have cell walls. Most plants can make their own food.

Pollen: A fine, usually yellow dust that is produced in the anther and is used to fertilize the seeds of the plant.

Pollination: The process by which pollen is moved from the male part, or stamen, of a plant to the female part, or pistil, of a flower. This is done by the wind or by insects such as bees.

Procedure: A set of steps that tells how to do something.

Property: Something about an object that helps identify what it is.

Root: A plant part that grows down into the soil. The roots absorb nutrients and water that the plant needs.

Same: Alike; not different.

Seed: The structure formed when a pollen grain fertilizes an ovule.

Senses: Touch, taste, smell, sight, and hearing.

Shape: The form of an object.

Shoot: The part of the plant that is above the ground, such as the stem and leaves; new plant growth on a plant.

Size: A measurement of how big something is.

Stamen: The male part of a flower that consists of the anther and filament.

Stem: The part of a plant that supports the leaves, fruit, or flowers.

Stigma: The sticky top of the pistil. The stigma receives the pollen.

Thinning: The process of removing some plants to make room for the others to grow better.

Tool: An object used to do a task.

Weight: A measurement of the force of gravity on an object.

ADDITIONAL TERMS:

Nutrients: Something living things need to grow and stay healthy.

Soil: The mixture of humus and earth materials in which plants grow; dirt.

Space: One of the things plants need to live and grow.

Sunlight: A special kind of energy that makes it possible for us to see and plants to grow.

Water: A clear liquid made of hydrogen and oxygen. All living things need water to live and grow.

Plant Growth & Development Resources

BOOKS & FIELD GUIDES

Blossoms on the Bough. Anne Ophelia Dowden.

Diary of a Worm. Doreen Cronin.

Eyewitness Books: Tree. Dorling Kindersley.

Eyewitness Books: Plant. Dorling Kindersley.

From Flower to Fruit. Anne Ophelia Dowden.

From Flower to Flower: Animals and Pollination. Patricia Lauber and Jerome Wexler.

From Seed to Plant. Gail Gibbons.

Golden Guides: Trees of North America. C. Frank Brockman and Rebecca Marrilees.

Golden Guide: Wildflowers. Alexander C. Martin, Herbert S. Zim and Rudolf Freund.

How Groundhog's Garden Grew. Lynne Cherry.

Lily's Garden. Deborah Kogan Ray.

National Audubon Society: Field Guide to Wildflowers: Eastern Region.

One Small Square Series: Woods. Donald M. Silver.

Also: Backyard, Swamp, Seashore and Pond

Peterson Field Guides: A Field Guide to Trees and Shrubs.

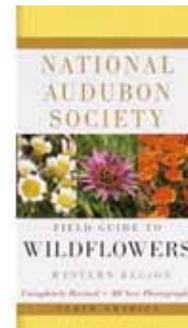
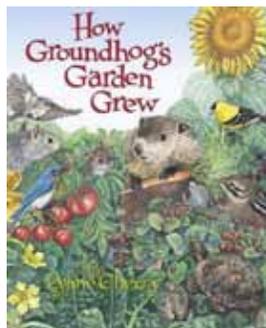
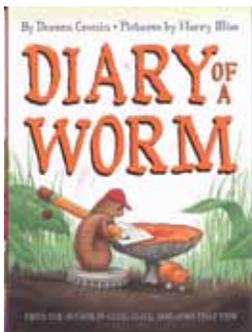
Project Food, Land & People

Project Learning Tree. American Forest Foundation.

Seed, Leaf, Flower, Fruit. Maryjo Koch.

The Tree Identification Book and The Shrub Identification Book. George W.D. Symonds.

Tree - An Eye Know Book: Discovery Starts With a Single Word. Penelope Arlon.



WEB RESOURCES

Foss Web: <http://www.fossweb.com>

Kids Gardening: <http://www.kidsgardening.org>

Kids Growing Strong: <http://kidsgrowingstrong.org/Pollination>

Smithsonian Education: <http://www.smithsonianeducation.org/educators/index.html>

BugGuide.Net: www.bugguide.net



Activity I: Adopt A Branch



Level: Grade 2

Pacing Guide / Science

Standard Insertion:

Observing Leaves and Flower Buds and visit tree or shrub throughout the unit (weekly or bi-weekly)

Subjects:

Math, Art, and Language Arts

Material List:

Clipboard,
Twig Study Sheet
Pencil
Ruler

Time Considerations:

30 minutes

Objective: Students will observe and become more familiar with the structure, growth, and growth rate of a developing twig at the end of a tree or shrub branch (in spring). Students will draw, describe, and measure a twig on a series of bi-weekly visits through the spring season and record changes as a twig grows.

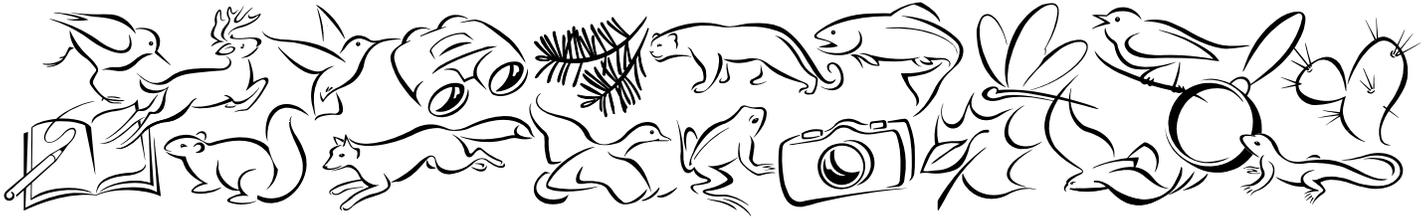
Background Information: Trees and shrubs grow new parts each spring at the ends of their branches. It is amazing to watch how the tiny new leaves and flowers expand out of the buds, which have protected them throughout the winter. The wood and bark at the end of each branch also gets longer to hold these new leaves and flowers out into the air and sunshine away from other leaves and flowers.

During the summer and fall, when we can see a tree or shrub growing its seeds and fruits, it is already forming the tiny new leaves and flowers for the new spring growing season. However, we do not see these new parts until spring because they have been hidden inside protecting covers called buds. These buds protect the tiny flowers and leaves with waxy or hairy covers, which prevent them from drying out during cold winter weather. Each type of tree or shrub has its own special type of bud with different shapes, colors, sizes, and coverings. You can be a nature detective and use the type of buds on a plant to figure out what type of plant it is.

ACTIVITY:

1. Choose a group of trees or shrubs convenient to the classroom with some branches low enough for students to easily reach, measure, and observe them.
2. Have each team of two or three students use a twist tie, piece of string, or similar material to mark a branch that they wish to study.
3. Have students draw the last eight inches of the branch where the buds containing the potential new leaves and/or flowers are located.
4. Have students describe the twig's color and texture as well as the color, shape, and texture of the buds. This can be done orally if necessary with teacher recording the descriptive words.

5. Have students measure the length of the tree bud at the end of the branch and record this information on their study sheet.
6. Have students record measurements of the bud in the form of a simple bar or line graph, which can be used to track the amount and rate of growth of the expanding bud, leaves, flowers, and new twig over the period of the study. Students can graph growth rates individually, in small groups or as a whole class.



EXTENSIONS:

- Greet a tree. Give students a chance to get to know the trees in your schoolyard by using senses other than sight. Assign students a partner and give each pair a blindfold or bandana. One student will start blindfolded and the other will be their guide. Starting in a central location, have students carefully and safely walk their blindfolded partner to a tree, giving them a chance to feel, smell, and listen to the tree. Encourage them to feel the bark to see if it is rough, smooth, knobby, etc. After they get to know the tree, have each partner bring students back to the central location, take the blindfold off, and see if they can find their trees based on sight. After each partner has gone once or twice, bring students back together and ask them how they were able to find their trees and if it was easier or harder to locate their trees with or without sight.
- Map it! Have students draw a map from your classroom to their tree or shrub. Include a key and special features along the way.
- Give students time to observe their tree or shrub for signs of animal life. Have them record their findings in a small journal and write a short story about a day in the life of their tree or shrub. Have students share their story with the class and put them all together to make a 'Trees and Shrubs of Our Schoolyard' class book.

Adopt A Branch

Your Name: _____

1. Choose a tree or shrub branch and tie a piece of string, pipe cleaner, or twist tie to mark your branch so you can find it again.
2. Use a ruler to measure eight inches from the end of the branch. This part is younger and newer than the part of the branch towards the tree trunk. This is called the TWIG. It may look something like the picture on this sheet.
3. Use your ruler to measure the BUD at the outer end of the branch and write that number here:

4. Draw a picture of this newest part of the branch (or twig) you just measured.

5. What colors can you see on your twig and its buds?
6. What words can you use to describe your twig?
7. Are there any insects or other animals on your twig or can you find a clue that some have been there?
8. What else is special about your twig?
9. What would you like to learn about your twig?
10. If you have visited your twig before, what if anything has changed about your twig?



Activity 2: Pollinator Partners



Level: Grade 2

Pacing Guide / Science

Standard Insertion:

Why are bees important? Getting a handle on your bee.

Subjects:

Science, Language Arts, Math, and Art

Material List:

Pencil

Clipboard

Hand lens

Pollinator Partners search sheet

Optional:

Field guides

Digital camera.

Time Considerations:

30 minutes

Objective: Students will learn about and observe a variety of bees and other pollinating insects in and around the schoolyard.

Background Information: To attract insect visitors and to make use of them as pollinators, flowers have developed an infinite variety of colors and shapes. Each of the flower parts perfectly fit the tongue and body of a particular bee or fly or moth. All insect flowers have one or more of the following characteristics to attract insects:

- o High visibility, contrast, colors;
- o Scent, especially in night blooming plants;
- o Nectar; and
- o Abundant pollen.

Plants have food for sale (nectar and pollen) and they advertise this fact to attract insects. Pollen is necessary to fertilize plants but nectar is produced solely to attract insect visitors. The nectar is produced in special glands called nectaries. When collecting either pollen or nectar, the insect unknowingly effects pollination. Pollination is the transfer of pollen grains from the male part (stamens) of the flower to the female part (pistil). If pollination does not happen, the fertilization will not occur and the plant will therefore not be able to produce seeds or fruit.

Some plants can self-pollinate their own flower, while some rely on cross-pollination where pollen is transferred from one flower to another flower of the same species. Water, wind, insects, birds, and mammals help plants cross-pollinate. Many plants rely on insects for pollination. Butterflies, moths, bees, ants, beetles, flies, wasps, and other animals such as bats and hummingbirds help move pollen from flower to flower.

North American is home to 4,000 native bees but they are often feared by people and overlooked as nature's most important pollinators. Bees feed almost exclusively on nectar and therefore make several trips to each flower, ensuring a large amount of pollen is gathered and moved from plant to plant. Gardeners and farmers rely on bees to pollinate important crops such as flowers, fruits, vegetables, and herbs.

Honeybees are by far the most abundant pollinators. Some flowers have almost no nectar guides (lines or dots on the petals) to help the

bee locate food. Other highly advanced flowers have remarkable systems to ensure pollination.

Bumblebees are bigger and stronger than honeybees and most have a much longer tongue. They are able to pollinate flowers with long spurs and deep nectaries.

ACTIVITY:

1. Ask students what the word pollination means.
2. Ask students if they know how plants are pollinated (self or cross).
3. Have students share examples of pollination methods (wind, water, birds, insects, etc.).
4. Tell students to take a survey of the schoolyard to see if it is pollinator friendly.
5. Divide students into pairs.
6. Discuss the pollinator partner search rules with students: observing only, no collecting. As they have learned, many of the pollinators found in the schoolyard are insects and we do not want to hurt them or ourselves by trying to touch their delicate bodies. Students must also keep in mind that pollinators have an important job to do. Model how to observe an insect or flower with a hand lens.
7. Hand out materials: Pollinator Partners Search Sheet, clipboards, pencils, and hand lenses to each student or pair depending on how many clipboards and hand lenses you have available.
8. Show students the search boundaries and give them a time limit.
9. Students should head out in pairs, searching for all types of flowering plants (on trees, shrubs, bushes, and ground) and places where pollinators might seek shelter while circling their findings on the search sheet.
10. If you have access to a digital camera, have student take pictures of a pollinator, flower, etc. or go around and take pictures with each pair. You can use these images to assist students in sharing their search sheet findings with the class and extension activities. If you do not have access to a digital camera and have additional time to spend outside, help students identify their pollinator or flowers using field guides to flowering plants and insects.
11. At the end of the allotted time, bring students together to share their findings and interesting discoveries.
12. Ask students if they think the school grounds are pollinator friendly and have them share ideas on how they can attract more pollinators to the schoolyard.

EXTENSIONS:

- Place a white sheet or shower curtain near leaf litter and/or shrubs and flowers in the schoolyard during the day and visit it the following day to examine insect visitors.
- Make 'slime' with students and rub it on several trees or a fence in the schoolyard during the day. Visit the trees or fence the following day to examine insect visitors (Recipe for slime: old bananas, rotting fruit, and thick sugar water).
- Plant a bee garden and be a native gardener. Planting native plants is a simple way to improve habitat for native bees. Even a small garden helps bees. Plants species that provide nectar and pollen, flower at different times, and are native to your area. Avoid 'wildflower' seed mixes: most contain nonnative species. Keeping 'spent' winter perennials up during winter (instead of clearing them) will help native bees. Dry woody stems, especially those broken by winter wind, make perfect homes. Visit: www.xerces.org for handouts on creating and conserving bee habitat, plants for bees, and more. You can also download

regional lists of bee-friendly plants at: www.xerces.org/Pollinator_Insect_Conservation/xerces_publications.htm.

- Build a bee block. Drill small holes into an untreated block of wood, or tie a bundle of dried stems together and place them outdoors. Solitary bees will lay their eggs in the holes, which then serve as a nursery. For more information on how to help solitary bees, visit: www.audubonathome/solitarybees.
- Start a butterfly garden in your schoolyard. To find out more information on starting a butterfly garden in your schoolyard, visit the Connecticut Department of Environmental Protection (DEP) at: <http://www.ct.gov/dep/site/default.asp> and search 'butterfly gardens.' Also visit National Audubon Society's Audubon At Home page at: www.audubon.org and click on 'Education.'



Pollinator Partners Search

Is Your Schoolyard, Yard, or Neighborhood Pollinator Friendly?
Circle pollinators found in the schoolyard. Create a list of additional findings in the wild card box.



Insect on a flower



Wild Card



Dead Tree or Fallen Log



Ant Home



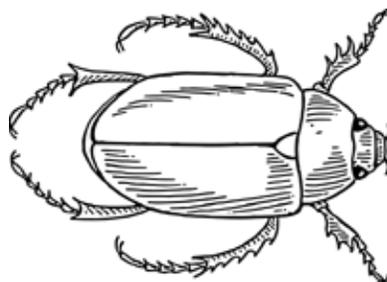
Butterfly



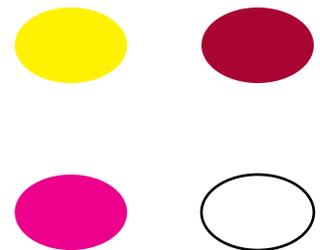
Wildflower



Insect Damage



Beetle



Flower Colors



Activity 3: Finding Flowers



Level: Grade 2

Pacing Guide / Science Standard Insertion:

Looking at Flowers & Pollinating Flowers

Subjects:

Science, Language Arts, Math, and Art

Material List:

Flower Search Sheet questions

White paper

Clipboards

Pencils

Hand lenses

Optional:

Digital camera

Field guides.

Time Considerations:

30 minutes

Objective: Students will observe a variety of flowering plants to see a variety of flower forms and colors.

Background Information: Flowers come in all different shapes, colors, sizes, and scents, providing beauty all around us. While flowers have conquered habitats all over the world and can be found along roadsides, in gardens, forests, ponds, and meadows, we sometimes forget that flowers exist for one reason: to produce seeds.

The structure of most flowering plants consists of roots, stems, leaves, and flowers. The flower is the plant's method of sexual reproduction, which gives rise to seeds and, eventually, new plants.

The roots of a plant anchor the plant in the soil, take up water and minerals from the soil, and receive and store food material from the leaves.

The leaves, through the process of photosynthesis, take sunlight, water, and oxygen to make sugar and starch.

The stems support a plant so that it can better utilize sunlight, hold the flowers up for pollinating insects or the wind, and also serve as a pipeline for carrying water and food between the leaves and the roots.

The flower is the reproductive unit of the plant. The plant spends a tremendous amount of energy building its flowers. Why? If a plant species is going to survive, it must reproduce.

The structure of a flower has all of the parts necessary to produce seeds. The pistil is the female part of the flower where the seed is produced. The sticky or feathery stigma, at the top of the pistil, traps the male pollen and is held by a stalk called the style. The stamen is the male part of the flower. Flowers can have two or more stamens, each one with a filament and anther. To pollinate the plant, pollen (male reproductive cells) must be transferred from the anther (which sits atop the filament) to the stigma. The pollen germinates on the stigma, sending a slender tube through the style into the ovary where the ovules (female reproductive cells) are found. The male and female cells are then joined in the process termed fertilization, and the development of the seed begins.

To attract insect visitors and to make use of them as pollinators, flowers have developed an infinite variety of colors and shapes. Each of the flower parts perfectly fit the tongue and body of a particular bee or fly or moth. All insect flowers have one or more of the following charac-

5. Show students the flower search boundaries and give students a time limit.
6. Students should head out in groups or pairs, searching for all types of flowering plants (trees, shrubs, bushes, and ground) and answering their search sheet questions for each flower.
7. If you have access to a digital camera, have students take pictures of one flower or go around and take pictures of their flowers. You can use these images to assist students in sharing their flower search sheet answers with the class and extension activities. If you do not have access to a digital camera and have additional time to spend outside, help students identify their flowers using field guides to flowering plants.
8. At the end of the allotted amount of time, bring students together to share their flower search sheets answers and interesting discoveries.
9. If time allows, search the schoolyard for a variety of flowers in two weeks and again at four weeks to see how things have changed.

EXTENSIONS:

- Have students identify and research one of the flowers they discovered (using a digital picture or field guide) in the schoolyard to find out if pollinators (and other animals) depend on it for food and/or shelter.
- Design your own flower. During class time or for homework, give your students the opportunity to design their own flower. Write the following four to five questions (or make up your own) on the board and have students create flowers based on their answers. Put out craft materials (glue, scissors, construction paper, crayons, markers, yarn, buttons, tissue paper, etc.). Have students share their flower with the class or put them up around the room and see if students can figure out each other's favorites.
 - oWhat is your favorite snack?
 - oWhat is your favorite color?
 - oWhat is your favorite animal?
 - oWhat is your favorite shape?
 - oWhat is your favorite smell?
- Press flowers. Allow students to pick one to four flowers in the schoolyard (or at home) to press. Make bookmarks or cards. Visit Martha Stewart's website to find out how to press flowers with your students at: <http://www.marthastewart.com/265285/pressing-flowers>.

AUDUBON ACTION: Be a Bee! For homework, have students think about their neighborhood in the eyes of a bee and decide if it would be a good place for a bee to live. Discuss what the words 'eco address' mean to your students. Eco address refers to the features of a place that affect the kind of home it is for living things. The natural landscape, the climate, the organisms (plants, animals and people) that live there, and the human-built features, such as roads and buildings—each of these are part of an eco address. Encourage students to come up with ways to help attract more bees (and other pollinators) to their neighborhoods and have them share their ideas with the class. If you have time, give them a chance to research one of their ideas and try to make it a reality in their neighborhood or at school.

Finding Flowers Search Sheet Questions

Your Name: _____

Does the flower have petals? If so, how many petals does it have?

What color are the petals?

Are the petals separate or together in a tube?

Is the center of the flower a different color than the petals? If so, what color is it?

Are there nectar guides on the petals?

Does the flower have sepals? If so, how many sepals does it have?

How many stamens does the flower have?

Can you see the pistil? If so, is there one pistil or many?

Do you think the flower is pollinated by insects or wind? Explain your answer.

Draw a picture of the flower.





AUDUBON ACTION



Be a Bee!

When you describe the features of a place that affect the kind of home it is for living things, you're describing an eco address. The natural landscape, the climate, the organisms (plants, animals and people) that live there, and the human-built features, such as roads and buildings—all of these are part of an eco address. Think about your eco address and decide if your neighborhood is good place for a bee to live.

If a bee were buzzing through your neighborhood, would it see good places to live? Check all the things it would see:

mostly houses tall buildings trees lawns flowers

Does your neighborhood have nesting habitat for bees (places where bees can live)?

bare ground dead wood plant stems

Write the colors of the flowers that grow in your neighborhood.

Can you find a bee on a flower or a flowering plant that a bee would spot in your neighborhood and draw a picture of it here:

Describe its flowers.

THINK ABOUT IT! Which of the features that you found in your neighborhood would attract pollinators like bees?

What can you do in your backyard or neighborhood to attract more bees and other pollinators (butterflies, bats, hummingbirds)? Write your ideas here and share them with your teacher and/or class. Choose one idea and research how you can make it happen at school or at home.



Grade 3



Animal Studies

Animal Studies - Standards

Life Science Standard: Students will demonstrate what processes are responsible for life's unity and diversity. Students will describe how different plants and animals are adapted to obtain air, water, food, and protection in specific land and water habitats.

Inquiry Standard: Students should demonstrate how scientific knowledge is created and communicated.

Plant Growth & Development Vocabulary

Here is a list of vocabulary words from your "Science & Technology for Children: Teacher's Guide to Plant Growth & Development" that you may want to use with your students while conducting Audubon lessons. You may also want to consider using the short list of additional terms.

Abdomen: A segment of the body of many animals.

Adaptation: A body structure or behavior that enable an animal to better survive or to reproduce; the process by which an organism changes.

Analyze: To study something by breaking it down into simpler parts.

Appendage: A structure that sticks out from an animal's body, such as a leg, a claw, or an antenna.

Arthropods: A group of animals that have jointed legs and outer skeletons.

Behavior: The way in which an organism responds to its environment.

Biodiversity: The numbers and kinds of organisms in a habitat.

Biosphere: Regions of the earth (including air, land, and water) that support life.

Canal: A waterway made by humans.

Classify: To put things together because they share one or more properties.

Conclusion: A decision that is based on observations or on a study of data.

Constant: A condition that is not changed in a scientific experiment.

Controlled experiment: A scientific investigation in which one variable is changed and all the others are kept the same, or constant.

Crustaceans: A group of animals with a protective exoskeleton covering their bodies.

Dam: A barrier that controls the flow of water.

Data: Information, such as that gathered during an experiment.

Environment: Everything that surrounds an organism.

Ethogram: A list of abbreviations for observed behaviors; used by scientists to help answer a research questions about animal behavior.

Evidence: Something that offers proof.

Exoskeleton: A hard outer shell that covers the bodies of certain animals, such as crustaceans.

Experiment: A procedure that is carried out to investigate a scientific question.

Habitat: A place where an animal lives.

Hibernation: A state in which an animal rests or becomes inactive when the weather becomes extremely cold.

Hypothesis: A predication about how something works or how two variables are related.

Instinct: Something that influences an animal's behavior but that does not have to be taught. For example, a fiddler crab digs a burrow for protection by instinct.

Lodge: A beaver's home.

Metamorphosis: A change in form or structure; the stages that an animal undergoes throughout its life cycle.

Molt: To shed a skin or an outer layer.

Nocturnal: Relating to or happening at night.

Opinion: An expression of how one thinks or feels about something. An opinion is based on personal views, not necessarily on facts.

Organism: A living thing.

Pattern: A repeating arrangement of shapes, colors, numbers, or other things.

Plankton: Tiny form of plant and animal life that float in water and are a source of food for aquatic animals.

Procedure: A series of steps that explains how to do something.

Property: Something about an object that helps identify it.

Random: Happening with no order or plan.

Response: The reaction of an organism to a stimulus.

Rodents: A group of small animals with large, sharp front teeth that they use to gnaw things. Squirrels and mice are rodents.

Segmented: Divided into sections.

Stimulus: An outside influence that causes an organism to respond in some way.

Structure: The way in which the parts of an object or organism are arranged.

ADDITIONAL TERMS:

Invasive species: A plant or animal that is not normally found in a particular region.

Native: Living or growing naturally in a particular region.

Resource: A part of the environment that people have deemed valuable or considered available for human use.

Surveyor: One whose job is to survey (collect data and determine the value of) land.

Wildlife: Animals that are not tamed or domesticated.

Plant Growth & Development Resources

BOOKS & FIELD GUIDES

About Birds: A Guide for Children. Cathryn Sill.

This series also includes: *Insects, Mammals and Amphibians* and have great illustrations.

Backyard Bird Watching for Kids: How to Attract, Feed, and Provide Homes for Birds. George H. Harrison.

Citizen Scientists: Be a Part of Scientific Discovery from Your own Backyard. Loree Griffin Burns.

Flute's Journey: The Life of a Wood Thrush. Lynne Cherry.

Flying Wild. Council for Environmental Education.

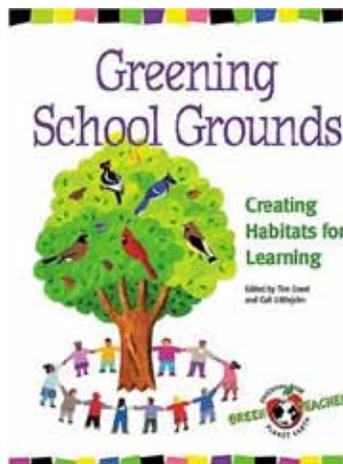
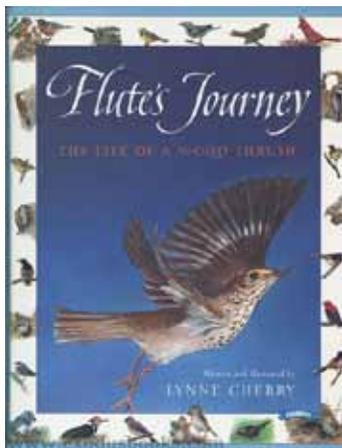
Greening School Grounds: Creating Habitats for Learning. Tim Grant and Gail Littlejohn; Green Teacher Magazine.

Nature in the Neighborhood. Gordon Morrison.

One Small Square Series: Woods. Donald M. Silver.

Also: *Backyard, Swamp, Seashore, and Pond*

Project Wild. Council for Environmental Education.



WEB RESOURCES

Cornell Lab of Ornithology: All About Birds: <http://www.allaboutbirds.org>

CT DEEP: <http://www.ct.gov/deep/>

Foss Web: <http://www.fossweb.com/>

National Geographic: Kids. <http://kids.nationalgeographic.com>

U.S. Fish and Wildlife Service: Schoolyard Habitat Project Guide: <http://www.fws.gov/letsgooutside/educators.html>



Activity 1: Adopt A Plot



Level: Grade 3

Pacing Guide / Science

Standard Insertion:

Observing Humans Closely: Observe School Habitat & Obtain or Create a Floor Plan of the School

Subjects:

Math, Science, Language Arts, Social Studies, and Art

Material List:

Adopt-a-Plot template

Pencil

Clipboard

String or flagging tape

Popsicle sticks

Measuring tape or yard sticks

Optional:

Digital Camera

Time Considerations:

45-60 minutes

Objective: Students will assess a variety of schoolyard habitats in search of the essential components needed to support a variety of birds, mammals, and insects on school grounds.

Background Information: For an animal to survive, it must have the right kinds and amounts of food, water, shelter, and space (also known as resources). Each type of animal needs particular food, and places where it can find shelter from the weather, hide from predators, build a nest, and raise young. As long as an animal can find these resources, it can stay in an area. If it cannot find these resources, the animal must leave or it will die. To support a wide variety of animal life, a natural area needs a wide variety of natural foods. These could include a variety of trees, shrubs, vines, grasses, and flowers for plant-eating animals (herbivores) like insects. These animals, in turn, can provide food to larger animals such as hawks, owls, fox, and coyotes. As more and more natural areas are developed, it becomes harder for wildlife to find habitats with the right types and amounts of the resources they need. School grounds can provide the needed resources for wildlife and students can be both detectives to find these resources and wildlife managers to help improve the supplies of these resources for wildlife by adding new plantings to provide food and shelter.

When students are examining an area of the school grounds to determine what types of resources are available for wildlife, they may also come across evidence of animal activity in the form of footprints, scratch or chew marks, food remains, scats, or nests or other homes.

ACTIVITY:

1. Tell students that they are going to be schoolyard habitat surveyors. They are going to figure out how they can attract and support different kinds of birds, mammals, and insects to their schoolyard.
2. Show students a variety of pictures of Connecticut wildlife (mammals, birds, insects, fish, reptiles, and amphibians).
3. To make the schoolyard more attractive to wildlife, they will need to think in terms of wildlife habitat.
4. Review what the word habitat means. A place where an animal can

get everything (resources) it needs to survive and raise young.

5. Ask students what animals need in their habitat to survive. Food, water, shelter, and space. Have students think about a variety of birds, insects, and mammals and what these animals eat, where they seek shelter, etc. Create a small list on the board so students can think about what they can add to their plot.
6. Ask students what they think would happen if we removed some or all of one of these necessary component from an animal's habitat? Some or all of the animals would have to leave the area.
7. Show sample pictures of garden areas that people have developed around their homes, schools, etc. to improve them for the wildlife. Students should notice that they have used a variety of plants ranging from short flowers to small shrubs, large shrubs, vines, and trees as well as birdbaths to make the areas more attractive to and supportive of wildlife.
8. Tell students that when they go outside, they should be thinking of how some of these plants could be added to their schoolyard to help these animals.
9. Ask students to describe their schoolyard and draw a large map of their responses. Students can draw their descriptions as well.
10. Obtain a map of your school and schoolyard.
11. Divide students into survey groups of three or four.
12. Using the rough draft class map and the official school and schoolyard map, divide the schoolyard into five to eight sections, depending on number of survey groups.
13. If you have time, have students study the map of the school and schoolyard before heading outside, or photocopy each section and hand them out to each study group.
14. Explain the instructions to students before heading outside. Students will need to go to their plot.
15. Hand out materials: Adopt-a-Plot template, pencils, clipboards, string, Popsicle sticks, and tape measure/yard sticks. If you have access to a digital camera, bring it outside with you.
16. Have students decide who will be in charge of each task prior to going outside. Students should be in charge of: drawing the map, measuring the plot, and marking features for the plot map and legend.
17. Once outside, have student's head to their plot and using their map, measure out their plot using their tape measure/yard stick, string or flagging tape and Popsicle sticks. Once survey groups have roped off their plot, have students draw a map of their plot using the Adopt-a-Plot template or graph paper. Students should include everything they see: plants, animals, structures, sidewalks, fences, etc. and include these features in the legends. Students should record the distances on their map.
18. If you have access to a digital camera, have students take pictures of their plot features and take a large picture of the entire plot.
19. Students should remove string or flagging tape before leaving the area or get permission to leave their plots up for the duration of this activity.
20. Once back in class, students should put all of their plot maps together to form one large map or joint diagram of the schoolyard surrounding a copy of the school building.
21. Ask students to share their thoughts and ideas about how they could make their plot more inviting to local wildlife.
22. Have students add plants and additional features to their plot diagrams or make a photocopy or second copy of their existing plot and have them add healthy habitat components.



EXTENSIONS:

The National Audubon Society and the Cornell Lab of Ornithology sponsor the Great Backyard Bird Count each year. Citizen scientists across the United States count birds over a four-day span – and kids can help out, too. Find out how by visiting: www.birdsource.org/gbbc/kids.

Project FeederWatch (operated by Cornell Lab of Ornithology and Bird Studies of Canada).

- If you have a feeder station set up at your school, participate in Project FeederWatch, a winter-long survey of birds that visit feeders at backyards, nature centers, community area, and other locales in North America. For more information, visit: <http://www.birds.cornell.edu/pfw/>
- Set up a feeder station at your school. Learn what feeder types, placement, landscaping, and foods will attract birds to your schoolyard. For more information, visit: http://www.birds.cornell.edu/pfw/AboutBirdsandFeeding/abtbirds_index.html

BUILD YOUR OWN BIRD FEEDER. Students can make their own feeder to put out for local and migrating birds. Suggest using a milk container and provide them with the following website for directions on materials, building, and hanging their feeders outside.

<http://www.birds.cornell.edu/Page.aspx?pid=1642&q=make%20your%20own%20feeder>.

HELP BIRDS BUILD A NEST. Birds that build nests out of plant materials will eagerly use other materials, too. They will add spider webs, snakeskins, cocoons, horsehair and wool. Safety pins, buckles, and hairpins were found in one house wren's nest, and shirts, towels, and a garden rake were found in an osprey's nest! Try putting out the items listed below for birds to use for nesting. Drape them on a branch, or hang them in a plastic strawberry basket or a suet feeder.

- Thin strips of old, soft cloth
- String (cut to eight inches or less)
- Yarn (cut to eight inches or less)
- Hair from hairbrush
- Fur brushed from pet
- Cotton



REFERENCES:

U.S. Fish and Wildlife Service: Schoolyard Habitat Project Guide – Pages 24-29: Complete a Master Plan Assessment; Pages 33-34: Draw Your Master Plan; and Pages 35-36: Refine Brainstorming Ideas Into Goals



Activity 2: Animal Interview



Level: Grade 3

Pacing Guide / Science

Standard Insertion:

Researching Animal Behavior

Subjects:

Science, Language Arts, Art, and Social Studies

Material List:

Local animal resource materials (books, field guides, and online resources),

Pencil

Paper

Animal Interview: Cards, Help Wanted, and Questionnaire sheets.

Optional:

Old magazines.

Time Considerations:

60-90 minutes

Objective: Students will learn about a variety of local animals and how they are adapted to live on the schoolyard or nearby through the creation of job descriptions and interviews.

Background Information: Each animal has special things about its body or the way it lives, which help it stay alive where it lives. For example, a squirrel has sharp claws and strong muscles for climbing and jumping, good vision for guiding its jumps in trees, a long bushy tail to help it keep its balance as it climbs and jumps around in the tops of trees, and a sensitive nose to help it find nuts which it has buried in the ground. It also has hard, sharp teeth to help it chew into those hard nuts. These special body parts and abilities are known as adaptations. As students learn about what makes each type of animal successful in its role in nature, they will focus more and more on their adaptations and learn what makes them special.

ACTIVITY:

1. This activity will work best if students have started and/or completed the Adopt-a-Plot lesson.
2. Tell students that they will be working in teams to find out more about how local animals are adapted to live on or nearby their schoolyard.
3. Review the term adaptation.
4. Ask students why people have jobs. Do they know anyone who has gone on a job interview (a parent or friend)? Discuss what happens on a job interview. Ask students if they think some people are better fit to carry out certain jobs than others. Animals, just like people, have jobs in the natural world and some are better adapted to carry out (or have the right tools) these jobs than others.
5. Divide students into pairs.
6. Hand out one Animal Interview Card to each team. This is the animal they will be researching.
7. Explain that one team member will be the employer—the person looking for help. The other team member will be the employee—the animal looking for a job. The employer will need to create a job description using the Help Wanted worksheet and the employee will need to answer the Animal Interview questions.

8. Hand out the Help Wanted worksheet to employers and the Animal Interview worksheet to employees.
9. Students should use the books, field guides, and online resources provided to create both the job description and answer the interview questions.
10. Students can draw a picture of their animal or find a photograph from an old magazine (if provided).
11. Once completed, have teams take turns reading their job description followed by their animal interview in front of the class (with the employer asking the interview questions and the potential employee answering them).

EXTENSIONS:

- Animal Evidence Search Sheet: have students search the schoolyard or their neighborhood (for homework) for signs of animal life.
- AUDUBON ACTION: Is Your Yard or Neighborhood Wildlife Friendly? For homework, hand out the search sheet to your students and have them (with an adult) search their yard or neighborhood for the healthy habitat components. After students have completed the search sheet, have them talk with their families about some simple things they can do to help migrating animals at home and take a pledge to try one of the listed actions. Provide students with online how-to resources from the Audubon At Home resource list, Appendix section (Healthy Neighborhoods and Apartments), National Audubon: <http://athome.audubon.org/helping-birds>, and Cornell Lab of Ornithology: <http://www.allaboutbirds.org/page.aspx?pid=1138> to help them find out more information about their pledge action.

REFERENCES:

U.S. Fish and Wildlife Service: Schoolyard Habitat Project Guide – Page 31: Field Notes for Completing a Schoolyard Wildlife and Habitat Survey

Animal Interview Cards

House Sparrow	Eastern Chipmunk	Honeybee
Carpenter Ant	American Robin	Cabbage White Butterfly
Common Crow	Garter Snake	Gray Squirrel
Earthworm	Jumping Spider	Red-tailed Hawk

Animal Interview: Help Wanted

Your Name: _____

Manager (Your) Name: _____

Date: _____

Job Title: _____

Schoolyard Location: _____

Hours (Daytime or Nighttime): _____

Job Description: _____

Picture of Animal: Draw a picture or place a photograph and place it below.

Animal Interview: Questionnaire

Interviewer Name: _____ Date: _____

Animal Name: _____

Interview Questions

What is your name?

Tell me a little bit about yourself. Where were you born and where did you grow up?

What interests you about this job?

What is your greatest weakness? Strength?

Do you prefer to work independently or with a team?

When do you get your best work done – during the daytime or nighttime?

Describe a tough work situation and how you overcame it?

Are you comfortable working at high elevations?

Are you able to lift heavy objects?

Are you willing to travel?

Why are you the best animal for this job?

Animal Evidence Search

Circle signs of wildlife found in the schoolyard or your neighborhood.
Create a list of additional signs in the wild card box.



Scat or Droppings



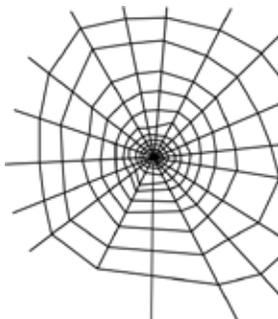
Wild Card



Bird Sounds



Tracks in the mud



Spider Web



Fur or Feather



Insect Damage



Animal Home



Chewed Seeds



Is Your Yard or Neighborhood Wildlife Friendly?

Find some or all of the four main components of a healthy habitat and then find out how you and your family can help migrating animals home at home.

FOOD

- Bushes or Trees with **BERRIES**
- Trees with **NUTS**
- FLOWERS** for hummingbirds and butterflies
- Plants with **SEEDS**
- UN-MOWED** lawn to encourage wildflowers and grasses
- LEAF LITTER** raked under and in front of shrubs for birds that eat from insects found under the leaves.
- BIRD FEEDERS**

SHELTER

- EVERGREEN TREES** for winter cover
- DEAD** or **DECAYING TREES**
- BRUSH PILES** or **FALLEN LOGS**
- NEST BOXES** for bluebirds, squirrels, wood ducks, house wrens, black-capped chickadees, tree swallows, and/or bats
- A STONE WALL**
- BUSHES**
- TREE HOLES**
- HOUSES, LEDGES, BARNES, BRIDGES AND SIGNS**

SPACE

- Not many **INVASIVE** species
- CATS** kept indoors
- Many **LEVELS** of plants growing for different uses
- CHEMICAL-FREE LAWN** to encourage beneficial insects for birds to eat

WATER

- Birdbath, fountains**
- Puddles**
- Pond**
- Stream**
- Wetland**
- Vernal (Springtime) Pond**



HELPING MIGRANTS AT HOME!

You and your family can help migrating birds and other animals by choices you make at home. Here are some questions to talk about with your family and some small tips on how you can make your home a richer place for animals on the move (and those that stay all year long). You can find more ideas online at 'Audubon At Home' (www.audubon.org/bird/at_home/index.html).

- 1 Does our yard or neighborhood have many different kinds of plants, or is it mostly lawn or pavement? A variety of native plants offers more food and nesting sites for birds.
- 2 Is our yard or neighborhood free of bug-killing chemicals called pesticides? (Pesticides kill helpful insects as well as harmful ones. They also harm birds and wash into waterways, where they harm fish.)
- 3 Does anyone in our family drink coffee? Is it shade-grown or organic? (Shade-grown and organic coffee comes from farms where rain forest habitat is protected.)
- 4 Does anyone in our family dump used motor oil or other waste into storm drains? (This can do great harm to waterways and the wildlife that needs them. Some people stencil signs above the openings to storm drains that say, 'Please help wildlife – do not dump!' Have you seen any signs on or above storm drains with similar messages in your neighborhood?)



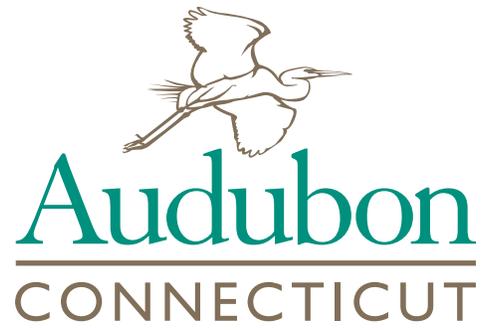
WHAT YOU CAN DO TO HELP BIRDS ON THE MOVE!

I _____ **pledge to**
(Your name)

help migrating birds by trying at least one of the following tips at home.

- Plant a native flower, tree with nuts, or shrub with berries.
- Create a water feature out of an old flowerpot or put out a birdbath.
- Keep your cat indoors (all year round or during migration periods in the spring and fall).
- Stop window collisions. Make sure traveling birds can see (and avoid) your windows by putting up screens, closing blinds when you leave the house, hanging cd's from string, or sticking decals on the glass during key migration times (spring and fall).
- Talk with your neighbors about changes they can make around their homes.
- Reduce or stop using pesticides on your lawn.
- Put up a nest box in your yard or neighborhood. For more information on nest boxes, visit the Cornell Lab of Ornithology at:
<http://www.birds.cornell.edu/nestinginfo/nestboxref/nestboxref/>.
- Leave snags for nesting places, fallen logs for food sources, and stack fallen tree limbs to create brush piles for shelter during bad weather.

For help with your pledge, visit National Audubon at: <http://athome.audubon.org/helping-birds> and Cornell Lab of Ornithology at: <http://www.allaboutbirds.org/page.aspx?pid=1138>



Grade 4



Ecosystems and Land & Water

Animal Studies - Standards

Life Science Standard: Matter and Energy in Ecosystems – Students should demonstrate how matter and energy flow through ecosystems. Students will describe how animals directly or indirectly depend on plants to provide the food and energy they need to grow. Students will describe how natural phenomena and some human activities cause changes to habitats and their inhabitants.

Inquiry Standard: Students should demonstrate how scientific knowledge is created and communicated.

Plant Growth & Development Vocabulary

Here is a list of vocabulary words from your “Science & Technology for Children:Teacher’s Guide to Ecosystems” that you may want to use with your students while conducting Audubon lessons.You may also want to consider using the short list of additional terms.

Adapt: To change to fit a new situation or use.

Aquatic: Living in water.

Classify: To group things together because they share one or more properties.

Consumer: An organism that feeds on other organisms or organic matter because it cannot make its own food.

Disrupt: To upset the development, movement, or organization of someone or some thing.

Ecology: The science concerned with the relationships among living things and their environment.

Ecosystem: A community that includes all the living and non-living things found in a certain area.

Environment: Everything that surrounds an organism and influences it.

Evidence: Something that offers proof.

Habitat: A place that is natural for an organism to live.

Organism: A living thing.

Pattern: A repeating arrangement of shapes, colors, numbers, or other things.

Pollutant: Anything that spreads harmful or unpleasant substances into the air, water, or ground.

Producer: An organism that can make its own food through the process of photosynthesis.

Scavenger: An organism that eats dead or decaying organic matter.Also known as decomposers.

System: A number of objects or units that move or work together as a whole.

Terrestrial: Of or related to the land.

Water pollution: Condition that exists when harmful materials have entered the water and make it harmful to organisms.

Watershed: An area of land that is drained by a stream or river and its branches.

ADDITIONAL TERMS:

Carnivore: A meat eater.

Decomposer: An organism that helps decay fallen logs and leaf litter.

Food chain: When nutrients are passed on from one living thing to another.

Food web: A pattern of food chains that come together.

Herbivore: A plant eater.

Omnivore: An animal that eats both plants and meat.

Predator: An animal that hunts or captures other animals for food (prey).

Prey: An animal that is hunted and eaten by another organism (predator).

Ecosystem Resources

BOOKS & FIELD GUIDES

Awesome Ospreys: Fishing Birds of the World. Donna Love.

One Small Square Series: Woods. Donald M. Silver.

Also: Backyard, Swamp, Seashore, and Pond

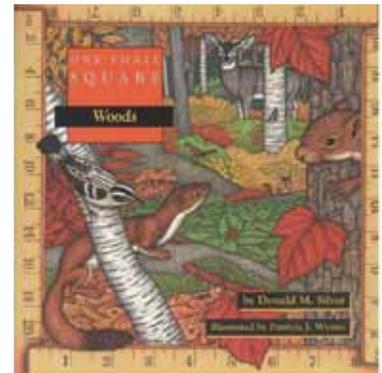
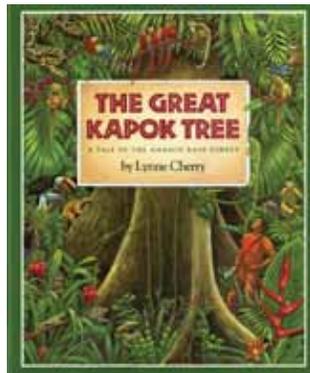
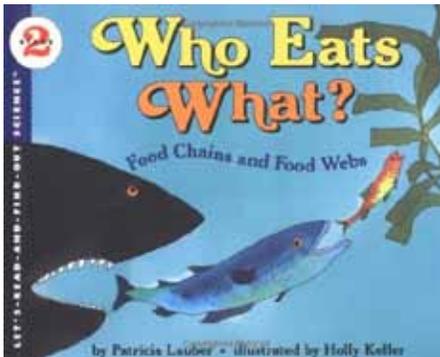
Project Wet

Project Wild: Aquatic. Council for Environmental Education.

The Great Kapok Tree. Lynne Cherry.

The Magic School Bus Gets Eaten: A Book About Food Chains. Pat Relf and Joanna Cole.

Who Eats What?: Food Chains and Food Webs. Patricia Lauber.



WEB RESOURCES

Long Island Sound Study: www.longislandsoundstudy.net

CT Department of Energy and Environmental Protection (DEEP): <http://www.ct.gov/deep>

Foss Web: <http://www.fossweb.com>



Activity 1: Making Links



Level: Grade 4

Pacing Guide / Science

Standard Insertion:

Joining Terrarium & Aquarium

Subjects:

Science, Language Arts, Social Studies, and Art

Material List:

Books

Field guides

Online resources

Making Links Animal Cards

Making Links Research Questions

Mobiles:

Cardstock or sturdy paper

Pencils

Crayons

Markers

Colored pencils

Scissors

Hole punchers

String or fishing line

Time Considerations:

60-90 minutes

Objective: Students will create a food chain for wildlife found on and around their schoolyard and present them in mobiles.

Background Information: Different animals have different food requirements. Squirrels eat nuts, spiders catch insects in their webs, and caterpillars eat leaves. For every animal that schoolchildren see around them, the ultimate source of their energy for living is sunlight captured by plants. This energy is then passed to the animals that eat the plants, and in turn passed to higher predators such as snakes, hawks, and foxes. Food chain is the term used to refer to the series of links or energy exchanges from sunshine to plant (producer), from plant to plant-eater (herbivore), and from plant-eater to predator or carnivore. It is important to remind students that once the energy has been used up, the leaves of plants must capture a new supply of energy from the sun. Like gasoline for our cars, once we have used up the gasoline, we need to get more if we want the car to work.

For students to better understand how this energy flows through an ecosystem, it can be fun to research the path or food chain of the energy from sunshine to producers to herbivores to carnivores. By drawing the links in these food chains, they can show their classmates, parents, and the school community how many different food chains can be found on their school grounds.

ACTIVITY:

1. Ask students if they can tell the class what a food chain is. You can draw a food chain diagram example on the board or ask students to give you an example (you can draw or they can). Ask students what a food web is, and how a food web is different or similar to a food chain.
2. Review food chain terms with students (producer, herbivore, omnivore, and carnivore). Ask students what the ultimate source of energy is for producers (sunlight). Review the terms predator and prey.
3. You can also have students hold cards with food chain terms to show the class how energy moves through an ecosystem. Words should include: sunlight, producer (plant), herbivore

(grasshopper), omnivore (chipmunk), and carnivore (red-tailed hawk).

4. Explain to students that they are going to get a card with the name of an animal that may live on, near, or stop over on their school grounds. Students will research and create a food chain mobile showing three or four feeding relationships and a short story about their animal to share with the class.
5. Hand out Making Links Animal Cards to each student. Then hand out Making Links Research Questions sheet. Give students 30-40 minutes to research their animal using books, field guides, and online resources and answer research questions to help them collect the information needed to complete their mobile. If it is an option, allow students to print out a photo of their animal or show students a photo of their animal from a book, field guide, or online resource when presenting to the class.
6. If you have 30 minutes, go outside and give students a chance to observe animals in the schoolyard and investigate where their food chain animal might find food, water, shelter, and space.
7. Once they have completed their research questions (and have possibly explored the schoolyard), give students time to create their mobiles. If you do not have time to complete this portion of the lesson at school, have students bring home materials and create their mobiles for homework.
8. Remind students that they do not have to be amazing artists to create their food chain mobile and to do the best they can. They can seek help from a classmate if they are really stuck on drawing an animal.
9. Hand out materials: Cardstock or sturdy paper, pencils, crayons, markers, colored pencils, scissors, hole punchers, and string or fishing line. Make sure books, field guides, and online resources (images) are available for students to look out while drawing their food chain. Give students 30-40 minutes to draw, color, cut out, and thread together their food chain. Students should create a vertical design with the carnivore at the top; omnivore, then herbivore in the middle; and producer at the bottom. Students should punch holes at the top and bottom of each drawing, and then connect each drawing with string or thread.
10. Once students are finished, have them share their research questions and mobiles with the class.
11. Hang mobiles in your classroom or display them in the media center or cafeteria.



EXTENSIONS:

- For homework, have students write a short story about a day in the life of their animal. Put all of the stories together and create a schoolyard animal book to share with other classes.
- Create a class food web of an osprey, one of the now common birds of prey found along the shore of the Long Island Sound. Assign each student one piece of the food web to research and create a visual. Once completed, see if students can make connections from one part of the osprey's food web to the next. Use a ball of yarn or have students gently toss a ball to each other, showing the transfer of energy.
- Complete a survey of invertebrates and vertebrates on the schoolyard and have students make lists, conduct counts, and create maps and descriptions of the locations where the species were found.
- Have students discuss and write a short essay on how people can help protect and conserve animals and the habitats they rely on for survival.
- Discuss opportunities to create more food chains on school grounds by adding new plants or other features to the schoolyard.

- Start a compost container at home, in the classroom, or in the lunchroom. For more information on starting a worm composting system read Mary Appelhof's book *Worms Eat My Garbage* (Flower Press, 1982) or visit 'Cornell Composting' at: <http://compost.css.cornell.edu>.

AUDUBON ACTION: Action-savvy kids are making good things happen for wildlife and wild places all over the United States. They are making a difference from California to New York and places in between. Whether they are helping habitats on a beach or prairie, in a wetland or forest, all have something in common. Each has answered a call to action. Most were inspired by what they saw and experienced in the natural world around them. Many were concerned about a particular place that mattered to them personally. Connecting with nature is often the first step to caring about what happens to natural places and wildlife. Have students think about a natural place that they care about. It might be a nature sanctuary and/or center, a pond, an old forest, a vegetable garden, a neighborhood park or even a small square of flowers and grass outside of their home. Have them make a field guide to their special area. Check out the AUDUBON ACTION section for directions.



Making Links Animal Cards

Blue Jay	Eastern Chipmunk	White-tailed Deer
Carpenter Ant	Striped Skunk	White-footed Mouse
Woodchuck	Herring Gull	Gray Squirrel
Millipede	Garter Snake	Short-tailed Shrew
Raccoon	Coyote	Grasshopper
Bumblebee	Centipede	Monarch Butterfly
House Finch	Red Fox	American Toad
Northern Cardinal	Red-backed Salamander	Red-tailed Hawk

Making Links Research Questions

Your Name: _____

Animal Name: _____

1. What does your animal eat?
2. Is your animal an herbivore, omnivore or carnivore?
3. If your animal is an omnivore or carnivore, how does it catch its prey?
4. What might eat your animal?
5. Where does your animal live (Examples: pond, forest or meadow)?
6. Does your animal like to live alone or with others of its kind?
7. Where does your animal rest or hide from predators or prey?
8. Does your animal have any special adaptations to help it avoid being eaten or capture its prey?



Taking it Outside!

Think about a natural place that means a lot to you? Is it a nearby park or nature center? A special pond or stream? An old forest or a garden? Share what makes it special by creating a visitor guide for it

Some things to include in your guide:

- Reasons why it is special or favorite.
- Highlights of the not-to-miss natural features and creatures that can be seen there.
- An area map or directions for how to get there.
- A trail map or map of the grounds with labeled points of interest.
- Ways to help protect the place. Find a ranger, naturalist, or other expert (parent, community volunteer or teacher) who knows about your place. Ask him or her what problems the land, water, birds, and other wildlife face there, and what people could do to help.

After you've gathered up the information, think about what you want your guide to look like and how to organize it. Use a computer to design it or create it by hand. Once it's finished, share it with you family, friends, neighbors, teachers and classmates. See if you can get permission to hand out your guide to visitors on busy days or ask if there's a place you can leave copies for visitors to find.



Land & Water - Standards

Life Science Standard: Forces and Motion – Students should demonstrate how external sources of energy affect the Earth’s systems. Students will describe how the sun’s energy affects the water cycle and describe the role of water in erosion and river formation.

Inquiry Standard: Students should demonstrate how scientific knowledge is created and communicated.

Plant Growth & Development Vocabulary

Here is a list of vocabulary words from your “Science & Technology for Children: Teacher’s Guide to Land & Water” that you may want to use with your students while conducting Audubon lessons. You may also want to consider using the short list of additional terms.

Condensation: The process by which a gas becomes a liquid.

Deposition: The process by which water or a glacier lays down earth materials.

Ecosystem: A community that includes all the living and non-living things found in a certain area.

Erosion: The process by which earth materials are broken down and moved from place to place.

Evaporation: The process by which a liquid becomes a gas.

Experiment: A procedure that is carried out to investigate a scientific question.

Flood: Overflow of a body of water beyond its banks or shore.

Flow: The amount of water or water-saturated material that passes a channel point in a given amount of time.

Ground cover: Grasses, plants, and decayed plant material.

Ground water: Water that has soaked into the soil.

Hypothesis: A predication about how something works or how two variables are related.

Precipitation: Rain, snow, sleet, or hail.

Soil: The top layer of earth. Soil is composed of organic materials (humus), inorganic materials (sand, silt, and clay), water, and air.

Surface water: Water that stays on the earth’s surface rather than sinks into the soil.

Water cycle: The process by which water moves through the ground, evaporates from earth into the air, forms clouds, and falls back to earth as rain or snow.

Watershed: An area of land that is drained by a stream or river and its branches.

Wastewater: Water that has been used.

Weathering: The process by which earth materials are broken down by natural forces.

ADDITIONAL AUDUBON TERMS:

Inorganic: A material made of non-living components (sand, clay, gravel, and rocks).

Organic: A material made of living components (plants and animals).

Pollutant: Anything that spreads harmful or unpleasant substances into the air, water, or ground.

Sediment: Broken down organic or inorganic material removed by erosion and moved by water, wind, ice, and gravity.

Slope: A slanted or tilted surface.

Water pollution: Condition that exists when harmful materials have entered the water and make it harmful to organisms.

Land & Water Resources

BOOKS & FIELD GUIDES

A Drop Around the World. Barbara Shaw McKinney and Michael S. Maydak.

A Drop of Water: A Book of Science and Wonder. Walter Wick.

A River Ran Wild. Lynne Cherry.

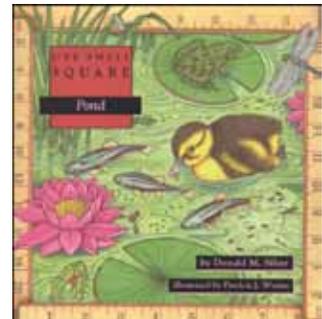
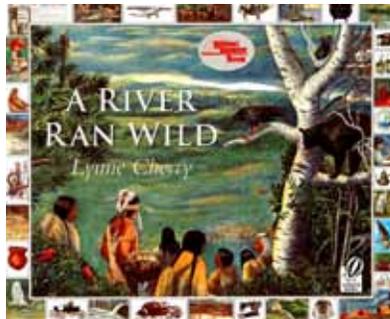
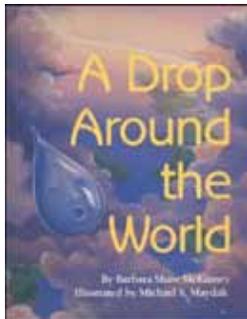
One Small Square Series: Woods. Donald M. Silver.

Also: Backyard, Seashore, Swamp, and Pond

Project Wet

The Sound Book: An Informative Citizen's Guide to Long Island Sound and the Watershed. Long Island Soundkeeper Fund, Inc.

Water, Water Everywhere: A Book About the Water Cycle. Melvin and Gilda Berger and Bobbi Tull.



WEB RESOURCES

Long Island Sound Study: www.longislandsoundstudy.net

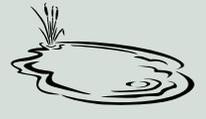
Environmental Protection Agency (EPA):

http://www.epa.gov/WaterSense/our_water/water_use_today.html

Foss Web: <http://www.fossweb.com>



Activity 2: On the Move



Level: Grade 4

Pacing Guide / Science Standard Insertion:

Where Does Water Go? Where Does Soil Go?

Subjects:

Science, Math, and Language Arts

Material List:

3 half pint or pint plastic bottles filled with water

Time Considerations:

30 minutes

Objective: Students will observe the impact of pouring water on areas of pavement and soil with and without vegetation on several sites around the schoolyard. Students will understand the concept of watershed and the challenges of preventing soil erosion and surface runoff on schoolyards and local home sites in addition to its potential impact they have on local storm sewers, streams, and Long Island Sound.

Background Information: Long Island Sound, like Chesapeake Bay, has a very large watershed with many different habitats, land-use types, businesses, and recreational uses. Over many decades, Long Island Sound has suffered from heavy metal and human sewage pollution. These types of pollution have caused summertime 'hypoxia' events in which oxygen supplies are so severely depleted that marine organisms can no longer survive and 'dead zones' form along the bottom especially in the western part of the Sound. The City of Stamford has an award-winning sewage-treatment plant to help prevent sewage pollution into the Sound. Storm water runoff can still reach Long Island Sound from yards, schoolyards, streets, parking lots, and roofs, carrying sediment, dog waste, motor oil, and fertilizer from lawns and farms, lawn pesticides, and other materials that are potentially harmful to the living things inhabiting Long Island Sounds. In Stamford, students can see an abundance of Osprey, which have recovered due to the work of Rachel Carson to ban DDT in 1972. DDT was once a popular chemical used to control insect pests on crops and forests, around homes and gardens, and for industrial and commercial purposes. The ban also helped Bald Eagle populations rise after near extinction in the United States. Similar to the work of John Muir's efforts to protect wild areas like Yosemite National Park, Audubon Society staff and volunteers have worked to protect natural areas such as Cove Island Park in Stamford. Cove Island is now designated as an Important Bird Area (IBA) helping to conserve habitats for birds and other biodiversity.

ACTIVITY:

1. Bring students outside to a spot in the schoolyard located on a slope that has a paved path, bare ground, and grassy slope.
2. Choose three students to be the 'official water pourers' and give each a plastic bottle filled with water.
3. Have three students stand evenly, one on the pavement, one on the bare ground, and one on the grass. Have the rest of the students

line up, shoulder-to-shoulder along the path so everyone can see the experiment.

4. Ask students to predict what will happen if the same amount of water is poured on three different areas: the paved driveway or path, the bare ground, and the grassy slope.
5. Ask students where they think the water will go? **DOWNHILL**. Next, ask students why will the water go downhill? **GRAVITY**.
6. Ask students which will go the farthest? Fastest?
7. Tell students you will count to three and they must each pour their bottle of water on the ground directly at their feet.
8. Count to three (you can have students do a drum roll to build excitement) and observe what happens to the water. The water poured on the pavement should travel the farthest and move the fastest along the surface. The water on the bare ground will also flow downhill moving slowly along the surface and then sink into the ground. The water on the grassy slope will sink into the ground immediately.
9. Have students track the flow of water and soil (or runoff) downhill towards low-lying areas where streams or storm sewers are located. Ask students where the runoff will end up (Long Island Sound)?
10. The experiment can lead to the following discussion topics:
 - **Surface run-off:** What would happen to oil that leaked from a car in the parking lot? Where will it travel? Where will it end up?
 - What organisms living in and/or visiting Long Island Sound do various pollutants affect?
 - **Groundwater vs. Surface Water**
 - **Flow and Slope:** Water speed is determined by **FLOW** and **SLOPE**. There is greater flow on the paved surface because none of the water is absorbed into the ground. The faster water moves, the more powerful it is and the more sediment and pollutants it can carry.
 - **Erosion:** Where is the soil most likely to be washed away: on the bare ground or the grassy slope? The grass and its roots help to hold on to the soil and slow down the water, preventing or slowing down erosion. There is greater water flow near the pavement, which leads to increased erosion. Fast moving water can carry a lot of sediment.

EXTENSIONS:

- **Finding the Words for Water:** Have students complete four simple questions about water and then create a poem to share with the class. Place poems outside of the classroom for other students in the school to read.
- Find a map of local waterways including nearby streams, brooks and rivers and/or a map of storm drain paths and follow their routes to Long Island Sound.
- Have students research current efforts and laws that already exist in their community to help prevent pollution problems.
- Have students write a letter to the mayor of their town or their local representative identifying the problems that still need more attention to continue the recovery of the health of the Long Island Sound ecosystem and all of its inhabitants.
- Brainstorm ideas of how the schoolyard could be better protected from soil erosion and discuss ways to help slow down and retain rainwater to better use it on school grounds.

- What's your watershed? Use your zip code and visit: epa.gov/surf with your students to find out the watershed address of your school and/or their homes.
- Join in the cleanup: Protecting rivers and helping restore riparian habitats is something everyone can do. Have your students (and their families), grade, or entire school join a group that is cleaning up a river near you. During the past 20 years, nearly a million volunteers have collected tons of litter from thousands of rivers and streams across the country. It's all part of the National River Cleanup. Find out when a cleanup is happening near your school or learn how to organize your own at: americanriver.org/cleanup/.

AUDUBON ACTION: Household Water Use Survey – According to the EPA's Water Sense Program, the average American family of four uses about 400 gallons of water each day at home. About 70% of the water used happens indoors, while outdoor usage accounts for 30% (but can be higher in drier areas of the United States and places where landscape irrigation occurs).



Finding the Words for Water

Your Name: _____

Sure, you know what water is. But can you describe it to someone who doesn't?
Answer these simple questions about water to find out.

WHAT does water LOOK like? _____

WHAT SHAPE is water? _____

HOW does water TASTE? _____

WHAT does water FEEL like? _____

How does water MOVE? _____

Water Poem: Adjectives Only!

Now look at what you've written. Circle every word in your answers that is an adjective. Create a poem on a separate piece of paper using only the adjectives you've used to describe water.



AUDUBON ACTION



Household Water Use Survey

How much water does your family use in one week?

Directions: Place a check mark in the correct box every time you and your family members use water.
Post this survey in a place where everyone will see it like in your kitchen.

Your Name: _____

Water Use Activity	Average Amount of Water Used	For How Long (Minutes)	# of times Per Day	Total Amount of Water Used
Flushing a toilet	5 gallons per flush	N/A		
Taking a Shower	7 gallons per minute			
Taking a bath	7 gallons per minute			
Brushing teeth	3 gallons per minute			
Washing hands or face	5 gallons per minute			
Washing clothes	55 gallons per load			
Running a dishwasher	15 gallons per load			
Hand-washing dishes	3 gallons per minute			
Washing a car	7 gallons per minute			
Running a sprinkler	12 gallons per minute			
Watering Plants	7 gallons per minute			

AUDUBON ACTION

Reduce Household Water Use

How can you reduce the amount of water your family uses?

Directions: After completing your Household Water Use Survey, place a check mark next to the ways you and your family can reduce the amount of water you use.

I _____ pledge
(Your name)

to try at least five of the following water waste reduction tips at home.

- _____ Turn off the water while you brush your teeth and wash your hands and face.
- _____ Take a five-minute or less shower.
- _____ When washing clothes in the washing machine, do a full load.
- _____ Use a shut off nozzle on your hose when washing your car or watering your plants.
- _____ Water your lawn or plants in the early morning or evening to reduce the amount of evaporation that occurs during the day.
- _____ Collect rainwater or use left over water from boiling food to water plants.
- _____ Be a leak detective and fix or replace leaky faucets and pipes.
- _____ Turn OFF the water when soaping your body or hair in the shower, then turn water back on to rinse off.
- _____ When washing dishes in the dishwasher, do a full load.
- _____ Replace toilets, faucets, or shower heads with low-flow ones.
- _____ When cleaning off driveways, stairs, decks, or patios use a broom instead of a hose.
- _____ Report leaky fire hydrants to your town's water department.
- _____ Spread the word! Share the Household Water Use Survey and these reduction tips with your family and friends.

Write down other ways your family can reduce the amount of water you use!

Frequently Asked Questions

What if I don't know how to identify many plants and animals on our schoolyard?

You don't need to be an expert botanist or biologist to engage your students and make the most of your schoolyard habitat. There is a wealth of information and resources available online and through easy-to-use field guides that will help you get started. If your schoolyard is newly planted, you may have access to the list of plants that are growing there. And you may discover that you know more than you think!

One way we advise teachers who may not know all the plants and animals in their schoolyard to engage students is to use "Search Sheets" to guide their exploration. For example, a red-tailed hawk habitat sheet or squirrel behavior sheet helps students identify elements of behavior and habitat through their powers of observation rather than through the memorization of the names of species.

What if I do not know the answer to a child's questions?

One of the benefits of your outdoor classroom is showing your students that even teachers are always learning and asking questions about the world around them. Be honest! Tell your students "That's a good question. I don't know the answer either! Let's look at it together to find out what we can about it." You can then lead your students through a series of questions—Where is it? What is it doing? What does it look like? (E.g. shape, color, texture, etc.). Where do you think it is going? Where could it hide? —and a wide variety of activities. Describe what they see and hear to draw a picture. Compare that picture to what you find in a field guide, or on a website. Create your own field guide to all of the plants and animals you encounter in your schoolyard. Use a digital camera to record your sightings.

Are there plants or animals to be concerned about on our schoolyard?

Just as children are taught to look both ways before crossing a street, we advise teaching students a few simple rules that will keep them safe without dampening their enthusiasm or creating needless fear of the outdoors. One of these is checking with you before touching unfamiliar plants or insects. For instance, Poison Ivy is a common plant in many areas that causes an itchy rash in most people when the plant's oil comes in contact with exposed skin. At the same time, it is a very distinctive, easily recognized plant that you and your students can learn to identify and avoid (Note: If you determine Poison Ivy is present in an area of the campus you wish to take your students, consult the groundskeepers or maintenance staff about possible removal).

Certain mammals will likely be common in your schoolyard, including squirrels and chipmunks. Depending on the habitat, you may encounter an occasional mouse or vole, or even a rabbit! Animals will naturally keep their distance from you, but students should not try to touch or feed them (birds being fed via bird feeders being a notable exception). Should you encounter any animal (even a neighborhood pet) that looks unhealthy or lethargic, is unsteady on its feet, or acting strangely, keep your distance, as it could be sick.

Insects vary tremendously in their temperament; many are quite tolerant of close observation. Even many bee species, as well as other insects that mimic them (i.e., display similar color patterns, but lack stingers), can be quite calm around people, if they are treated with care and respect. However, yellow jacket wasps and bald-faced hornets should be treated with extra caution. You do not like to be crowded, and neither do bees and wasps, especially around their nests. Give them several feet of breathing room and they will allow you to observe their activities without becoming aggressive. To avoid attracting insects, children should avoid having any

traces of food, candy, or perfume on their hands or faces when they go outdoors.

Is it safe for students to examine the insects and other arthropods in our schoolyard?

In general, it is quite safe for students to observe insects and other arthropods. For close-up examination, crawling insects, spiders, sow bugs, centipedes, etc. can be gently captured in clear plastic pill bottles, viewed with a hand lens, and then returned to their habitat.

How can I help students avoid Deer and Wood Ticks?

Ticks are a regular part of the outdoor world in Connecticut, the Northeast, and throughout the United States. As tick bites can expose you to illness, extra care should be taken to avoid ticks. You can teach your students to get in the habit of checking themselves for ticks crawling on their clothes, skin, or hair, and checking themselves again when they get home and change clothes. Some teachers use a system of “tick buddies,” in which each student has a buddy who helps scan the back of their buddy’s clothing to spot any ticks hitching a ride.

If the weather is rainy or chilly, I will have to cancel my outdoor lesson, right?

Not necessarily! We often conduct outdoor classes in light rain or on chilly days. Being prepared—with the right clothes and gear—is an important part of outdoor learning and a valuable learning experience. And it provides students with an opportunity to experience what birds and other wildlife experience every day. While good judgment should be exercised, don’t let a little rain, snow, or cold keep you out of your schoolyard habitat.

How can I best manage my class for a lesson in an outdoor setting?

We want a trip to the schoolyard to be fun and exciting, and for students to be prepared for their outdoor lesson. The best way to ensure this is to discuss the trip and behavior expectations fully before going outside. Provide clear directions, specific tasks and equipment for each child, clear target locations and boundary limits, and the time frame(s) for completing the activity. Using a “two-minute warning” signal outside, such as a rhythmic hand clap, can be very helpful in getting the children to focus on completion of their task(s) in the allotted time (but always maintain the flexibility to examine an unexpected ladybug or to listen to the call of a singing bird!) Please see pages XXX of this guide for more information about this topic.

How do I deal with the surprise appearance of wildlife such as a hawk, praying mantis or a sleeping raccoon in a tree, which is not in my lesson plan?

This is the best part of your outdoor classroom! Experiencing the new and unexpected, such as the arrival of a hawk chasing its prey, is a great opportunity for you and your students. Allow the children a few moments to simply observe and enjoy. Then you can ask them to make the same types of detailed observations noted above and consider the questions they would like to answer about the surprise animal(s). For example, if you are teaching about plants or food chains, ask children how an animal is dependent on plants for their survival even if they are predators.

How will our outdoor lessons link to the science and other curriculum standards?

The outdoor experiences and lessons we recommend strengthen a number of key science concepts, including observation, measurement, description, and communication.

In addition to the resources in this guide and online, what other resources are available to help answer our questions or for students who want to explore science and nature on their own?

Depending on your location, you may have a nature center nearby that students can visit. Nature centers provide a wide range of programs, activities, and resources to the community. Many communities are also home to birding or other nature clubs, which offer field trips or family programs. Your local municipality may offer a number of programs at local parks and beaches, or at the local library. Watch for announcements or articles in the local paper, your online “Patch,” or your area’s parenting guides and magazines.

When is creating our schoolyard habitat “done?”

Your schoolyard habitat is always changing! Each year, new plants can be planted, providing more flowers for pollinators. Birdbaths, feeders, and birdhouses can be added as you learn which birds most frequently visit your schoolyard. Each season you will see the demise of some plants and the healthy growth of others. A tree may topple in a storm, but its trunk or stump may later provide a home for woodpeckers. Each day, each week, and each season will bring something new to the schoolyard, and provide you with endless opportunities to engage your students and immerse them in science and nature.

