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Regions and Habitats

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The fourth grade is when students learn about the regions of the United States, primarily the current geography, habitats, resources and culture of the different regions. This is a year long process with about four to six weeks spent on each of seven regions: New England, Middle Atlantic, South East, Midwest, West, North West and South West. This unit is aimed at integrating this geographical approach to teaching the regions with a scientific understanding of the habitats within these regions and the plants and animals of these habitats. It is important to teach science and social studies hand-in-hand because neither exist in isolation; bringing this to the attention of the students will enable them to think critically and globally. Before writing this unit, the essential question, which is a timeless, universal theme, had to emerge. The essential question should be present in one way or another in every objective, lesson and activity of the unit and can be used throughout the year while studying the various regions. The purpose of an essential question is so that the unit is written to reflect a timeless and universal theme as well as to ensure higher order thinking as opposed to fact based learning; also, this question is one that remains with the children so they can keep reevaluating their world according to this question. The essential question for this unit: The world is made up of many interconnected habitats, and each habitat has its own food chain. How have these food chains affected the way humans live and how have humans affected the food chains of the habitats in which they live?

This unit will begin with background knowledge about food webs, habitats and regions of the United States of America. Following this portion, there will be a case study of each region and an animal that resides within that region. Each study will take into account the characteristics of the region, the habitat in which the animal lives, their placement in the food web of that habitat, and how their habitat and food availability have changed due to human interactions with the local ecosystem.

The different regions studied are defined by the text book we use in the fourth grade, *Regions and Resources*, published in 1997 by Silver Burdett Ginn Inc. The students will be using this text as a backbone for the rest of the unit because it is a good resource available and there are enough for each child to have one. The book is a good resource because it includes a section of map skills; there are many well drawn and labeled pictures, photographs and diagrams; each section includes a passage from a piece of literature that relates to that particular region; each region has a separate chapter that talks about its links to places around the world.

Objectives:

- Students will learn about the geography and habitats of the regions of the United States.
- Students will learn about the animals, in terms of food chains, of different habitats found in The United States.
- Students will learn about the relationship between living organisms and habitat.
- Students will learn to define and look ahead to consequences.
- Students will use text books, resource books and internet resources for research.
- Students will use maps to understand the climate of different regions and habitats. Maps will also be used to understand the dispersal of different animal species across the United States.
- Students will make predictions based on current scientific information.
- Students will practice writing about their opinion, expository and persuasive writing.
- Students will create bar and line graphs as well as pie charts to represent scientific data.

The objectives here all work within and towards the essential question and incorporate all of the disciplines taught in school: literacy, writing, math, science, social studies and social development. Learning across the disciplines will further help the children to see how nothing occurs in isolation, even though we have 'math time' and 'reading group' which seem to segment the day.

What is Ecology?

First, it is important to have a clear understanding of the word ecology as it is used in this unit. Ecology is a science and should not be confused with efforts of environmentalism. Ecology encompasses many aspects of the science of habitats; how animals and plants interact with and live within their environment, how animals and plants interact with each other, how this changes the way each evolves and how they survive in their surroundings. Ecology also entails how plants and animals are distributed and their abundance. When thinking about ecology all aspects of a living organism's world must be taken into consideration: predators, competition for food sources or living space, symbiotic relationships and growth (Smith, 1996).

Learning and teaching the regions of the United States is very daunting, as there are so many different aspects of each region that can and should be taken into consideration. It is very difficult for teachers to determine the focus of study for the regions- it is too broad to be taken as is- so there is a danger of fragmented learning or learning merely of the names of cities and landforms. The essential question guides the learning for this unit to focus around food chains. This is done for several reasons. One reason is because studying vertebrate animals is a part of the fourth grade science curriculum. The second reason is because

food chains are a big part of what make species and habitats evolve, an important part of ecology. A third reason is because by studying food chains the emphasis of learning is based on relationships, cause and effect. A final reason is because it is something that the children will be able to identify with. The children all know the importance of eating, especially if they try to remember a time when they had to wait a while to eat. By the end of the unit, the children will be able to place themselves within the food chain, and understand how their daily choices can change that food chain.

It is this understanding of ecology which drives the unit and the essential question. When students begin to think of ecology in this way, and see the interconnectedness of organisms and their surroundings they will feel a greater sense of attachment to learning about the world around them. This will enable the students to better identify with the world in which they live, how all living organisms-large and small- affect their habitats. This knowledge and understanding is empowering to children who sometimes feel that they are very small in a very big world.

In a time when we are becoming more and more divorced from the earth, it is crucial for children to learn how their daily decisions can manifest into some real changes. After talking with children, it is clear that a majority of them do not really understand where their food is coming from. Most of them can easily say fruits and vegetables come from plants found on farms. The children do not know where these farms are: how long did it take their food to get to them? What was the additional cost of shipment? How does this type of shipment for the majority of our world add up and have an effect on road conditions? Many more questions of this nature can be asked. Surprisingly, it was very evident from a short discussion with students that many of them do not make the connection to the pictures of chicken or cow they see in a book and the chicken or cow they see on their dinner plate. It was upsetting when a friend told a story about her son going out to a restaurant, ordering chicken and when it came he thought they gave him the wrong dinner because he did not know chicken had bones in it! This is not so much ecology but it is important for children to understand that their food does not come at just a monetary cost. Another aim of this unit is to make students more aware and help them to be educated and aware consumers.

Habitats

To a fourth grader, habitat will be understood as a 'place where things live'. This simplistic view of habitat is a good place to start, merely by showing colorful pictures of different habitats the students minds will begin classifying the many possibilities of 'places to live.' A habitat shapes the way an organism (not excluding humans) lives. A habitat is a space where the exchange of energy can take place, from thermal radiation to heat conduction, water conduction and water loss, etc. This exchange of energy is what keeps a habitat and an organism from stagnation and consequently extinction.

Exchange is going to be a recurrent word, it benefits to spend some time discussing possible meanings of the word exchange. Students generally know that products such as clothing can be exchanged at a store for different clothing or money. This idea of receiving one service or desired object in return for a giving a service or object (including money) is a workable definition. Students will easily be able to say they love having money, but at one time or another they have *exchanged* that treasured dollar for a new game or toy. Exchange is about value. What is the value of a sandwich? Not much if one has just eaten. However, a day

without food and that sandwich will be worth a great deal more, but just how much more? It will be important for students to understand that when animals *exchange*, they consider not the monetary cost but the physical cost of pursuing a food source- will the exertion expend more energy than the intake of the food will provide? Is there a great risk of predation (no sense going out to dinner if one ends up as the main course!)? While this is hard for the students to imagine, have them think of a time when their mom or dad did not want to go to the grocery store because of snow, they decided it would not be a good exchange- too much risk of danger for the food, it's better to go at a safer time.

A habitat also increases or decreases the need for this kind of exchange to take place. When the seasons change, this change in temperature alters the way different species spend the energy.

Fragmentation of Habitats

Habitat fragmentation is when an area of one habitat is made smaller and divided into smaller parts. This is what happens when a habitat is destroyed and parts of it remain. Habitat fragmentation is caused by roads, railroads, canals, powerlines, fences, fire lanes, pipelines and other barriers cut through habitats and inhibit species from moving freely. The real problem comes into play when the edge habitat is taken into consideration. What occurs on the outside edges of a habitat is far different than what occurs on the interior. The edge of a forest has much greater light and a greater possibility of being visited by a non-forest dweller than does the center of the forest. However, if a new cell phone tower needs to be put somewhere in that forest with two service roads for maintenance crews to access the tower from either side, that divides the forest in half. All along those cleared out service roads there are new edges to the forest, creating new interactions between edge species and interior species, interactions that have never occurred before and for which there are no evolutionary adaptations.

Lesson 1

Fragmentation is a more difficult concept for the children to understand. A hands-on approach helps to illustrate the idea and to make it a little more concrete. To introduce the idea, bake two identical cakes with plastic animal miniatures baked inside and show the children. Tell them they are both examples of the same habitat. Cut one of the cakes into 4-5 large pieces. Explain to the children that these are roads through the habitat and ask them if they think it changed what will happen to the animals in that habitat, brainstorm and list their ideas. Pull the pieces apart for the 'fragmented' and have children make detailed observations about what they see. This will get the students thinking how cutting up a habitat, like a cake, changes that space and limits the animals movements to other places within the habitat. From this introduction, the students should be able to generate the meaning of fragmentation. Explain how they need to decide

Lesson 2

Another, and more abstract way of helping the children to understand fragmentation take a roll of masking tape and section off large portions of the room, start with a few and add more 'roads' throughout the day. Label them as large, well-known highways and roads from the area: I-95, I-91, Merritt Parkway, etc. Explain to the children that they are now animals and that their habitat has been fragmented, review their definition of fragmentation from the day before. Talk about the dangers animals face if they decide to cross highways or busy streets, if they are able to cross at all. The students will begin to make observations about which children will not be able to get to the pencil sharpener, the computers, their reading group, etc. Once these observations have been made, ask them what it would be like if the pencil sharpener was where their winter

food source was, the computers were their water source and their reading groups were their fellow animals. Students will quickly realize what a problem fragmentation can be.

An example for discussion with the children: Your mom says, "You may play outside in the yard but stay three feet away from the street." That's fine, you have lots of room to play, draw a diagram on the board of a house with a front yard with a street, shade in an area to represent the three feet away from the street and label the remaining portion as 80 square feet to play (a quick review of area might be needed before discussion). Uh-oh, they need to put a street going along the side of your house where there was just an empty lot before. Draw this road on the diagram and show the children how much play room they lost. Tell them to imagine what it would be like to have a road going through the middle of their yard, and then show them how much play space they lose if they can't go more than three feet close to the edge of that road. Of course that could not really happen, and the children may object to the idea based on that, but it does help them to see how quickly square footage can be lost if edges are off-limits.

Habitat fragmentation can produce extinction of species in other ways. Some animals will not cross any kind of open space because of predators. When this happens species cannot disperse and create new populations. This also affects the plant life of a habitat because many plants depend on animals to disperse their seeds. If the animals are not dispersing, neither are these particular types of plants. Fragmentation is threatening in other ways. Many animals need a great deal of space to move about on to find adequate food. This is especially true as the seasons change and food and water availability also changes. By disabling animals to forage larger habitats and confining them to fragmented habitats, this forces overgrazing and eventual starvation of the species and loss of the habitat (Kareiva and Wennergren, 1995)

Food Webs

All living things need to find nourishment in one way or another, some can find it from many different sources while others only eat one food source: sea gulls will eat fish from the sea or dig through trash inland, pandas will eat only bamboo shoots. Animals have certain nutritional requirements that must be met in order for cell growth to take place. Animals need nutrients to keep their bodies healthy, they all need: glucose (sugars and carbohydrates), lipids (fats), proteins, vitamins and minerals, and water. Each nutrient is found in one type of food or another (Barré, 1998).

Every living organism in a habitat has a niche, a specific role to play within that habitat. There are three main niches: producers, consumers and decomposers. Almost all plants are producers, they provide food for other living things. Consumers eat other living organisms in a habitat, their role is to consume other organisms and be a part of a food web. Decomposers mark the end of the food chain. Fungi and bacteria get rid of dead organisms in a habitat. This is a very general explanation and is a good place to start the children. There is a more inclusive description of niches and food webs. Food chains and food webs are like steps on a ladder, and each step is called a trophic level, and each of the trophic levels fits within these niches. These trophic levels track the transfer of energy and nutrients within a habitat. The first level is the primary producers, which are flowering plants, they provide food for the primary consumers. These are usually herbivores. Primary consumers are eaten by the secondary consumers which can be either omnivore or carnivore. The third level consumer is called the tertiary consumer which may also be either omnivore or carnivore and they consume

the secondary consumers. Often there is a fourth level consumer, a quaternary consumer. Some animals can change levels depending on what they are eating and what their meal has eaten (Silverstein, Silverstein & Nunn, 1998).

A food chain explains the pattern of eating and of being eaten, every plant and animal is a part of at least one food chain. When a member of one food chain eats a member of another food chain these chains connect into a food web. Food webs include many plants and animals. Most food chains begin with energy from the sun, plants use the sun's energy and animals eat the plants for energy. All the living things in an habitat are connected in a food web. Food webs work with three parts: plants, herbivores and carnivores/omnivores. Although plants are at the bottom of the food chain, they could not survive without the herbivores, carnivores and omnivores (Kalman and Langille, 1998).

Herbivores

Herbivores are animals that eat the food around them. If an animal survives by eating only plants found in their environment, that animal is an herbivore. Herbivores that eat grass such as cows are called grazers, and animals that eat leaves from trees such as deer are called browsers. Herbivores have large back teeth so they can grind up their food. Herbivores typically have to eat a lot of plants to get enough of the energy they need because plants are hard for their bodies to digest. Most herbivores do not eat an entire plant, they may eat only the leaves, seeds, fruits or flowers. Herbivores are crucial to the food chain, without them, both the food that they eat and the animals that feed on them would suffer. Many of the plants that herbivores feed on depend on them to spread their seeds so new plants can grow in new places. Some plants have seeds that pass unharmed through an animals intestinal tract, when the animal is far away from its last meal and has fully digested the seeds are eliminated from the body and a new plant can grow. Other plants have sticky seeds or pods that adhere to the fur or hair of herbivores. As the animal travels and brushes against trees, rocks, etc. the seeds will drop off and take root. Without an adequate herbivore population, the carnivores that feed on them would have nothing or not enough to eat. Even if they began consuming other carnivores, eventually there would be a shortage of food.

Carnivores

Carnivores are animals that eat other animals, namely herbivores and sometimes other carnivores. When a carnivore hunts or kills another animal for food, it is called a predator, and the animal it eats is called prey. Predators are very important in an habitat, without predators the population of herbivores would grow unchecked until there were not enough plants left to eat. Some carnivores can only feed on a few specific animals due to physical size or shape, as in the case of the anteater which cannot open its jaws but can use a long sticky tongue to eat ants. There are other carnivores that eat a variety of different foods, such as alligators which will eat just about anything that will wade into or close enough to the water. The teeth of a carnivore are designed to deal with their food. Animals such as lions and wolves have large fang teeth, called canines, they use these for stabbing their prey. Between the canines are incisors, used for cutting into flesh and for cracking open bones are carnassial teeth at the back of the mouth.

Another type of carnivore is the scavenger, which feeds on dead animals. These animals keep the habitat clean by eating the leftovers from a predator's meal or by eating an animal that has died of age or disease. Scavengers are a crucial part of a food web because they prevent the energy of a dead body from being wasted.

Omnivores

Omnivores are animals that eat both plants and animals, because of this adaptation, they will rarely go hungry. They may exist at many points in a food web, depending on the type of food they are eating. Since omnivores eat whatever is available, they will have different diets depending on the season. An example of an omnivore is the raccoon. The raccoon will search many places for its food, it digs up worms and insects, eats fish and frogs, eggs and chicks can be found in trees as well as fruits and berries, and it is not unusual to find a trash can raided by raccoons in the middle of the night! The teeth of omnivores are just as versatile as the animals themselves and these animals frequently use their claws to compensate for strong sharp teeth (Riley, 1998).

Decomposers

Decomposers mark the end of the food chain. When the highest level of the food chain dies, scavengers and decomposers break down and use it along with the remains of other dead organisms from each trophic level. Their job is to make the energy found in those remains is not lost out of the habitat.

Regions and Their Habitats

The seven regions across the United States of America have within them several different habitats. Some kinds of habitats are present in more than one region, allowing the children to discover this on their own by comparing climate and land features will help the children develop their connecting skills and a true understanding of their country's landscape.

Before delving into the many different regions, it is important to give the children a point of reference: Where in the world is the U.S., and how does that shape the kinds of habitats found here? A preliminary study of North America and specifically the U.S. will orient the children. It will be important to have a discussion about the equator and the way climates change in relation to their distance from the equator. The equator is the line of latitude that runs along the middle of the globe. The equator not only splits the earth in half- Northern and Southern hemispheres- but is also the part of the earth that is closest to the sun. With this information, the students will easily draw the conclusion that this will be the hottest places on earth. The further away from the equator, the cooler climates become, where at the two poles it is very cold and uninhabitable.

Lesson 3

Talking about how climate differs from one continent to another but can also differ within the same continent or even country. Using the students own experiences to create associations between places and areas of the country will be very effective in creating a lasting understanding. Ask the children who has taken a vacation somewhere far way (a plane ride away or a long car ride- 6 or more hours). Find the vacation destination on a classroom map while putting a mark on where the school is, have the student talk about what the weather was like when they traveled. Make sure the student includes the time of year in which they traveled as well. Create a large chart in the room including the local yearly climate and comparing all of the vacation spots:

(table available in print form)

Giving all of the students their own maps and allowing them to mark a place where their classmates have traveled to and that is included on the chart, will give them something concrete to relate to their classmate's experiences. The students can mark each location with a different colored marker or crayon to represent a different climate or weather conditions. Creating a powerpoint or a collection of literature such as the National Geographic Series: Travels Across America (use list at the end of unit for additional resources) for a picture walk through the United States will help give students visuals about the kinds of habitats and landscapes they can find in the country and can add more destinations to the students' maps. Have the students make observations: How does the weather seem to change as we move North or South? How does the 'appearance' of the area change as we move West, or closer or nearer to a water source? Allowing the lesson to be taught by the students and their experiences will make the lesson more applicable to the students and helps the students build their confidence in the classroom.

Learning about habitats and regions in terms of climate is only part of the picture, to fully understand habitats. Temperature and seasonal change are only part of what makes a habitat, water availability also shapes a habitat. Students may not realize how important the presence of water is and how much its quantity can change an area from a dry desert to plains to a lush forest, which may differ only in rainfall and closeness to a water source. Once the students take just a minute to think about their knowledge of plants' need for water, they will quickly realize that rainfall and water can have major effects on plant and animal life. Again using the marked map, the classroom chart of vacation destinations and picture walks will give students that strong visual association of location and appearance.

Other factors need to be considered about climate and habitat, such as wind and weather patterns. For a fourth grader, this is much too in depth and would take too much time away from the focus of the unit. Some astute students may notice that some regions on the same latitude have different climates and habitats, this is a chance to include this perceptive student(s) in an enrichment activity. Sending the student to the school media center to do a small research project and then presenting to the class will help the higher level students feel challenged and will involve him or her on a deeper level, in the end, the entire class will benefit from their observations and curiosity.

It is important to start the study of regions by learning about the region in which the students live. This gives them the chance to assign proper terms and to identify habitats and organisms that they are already familiar with and probably see regularly. Starting small will give students a basis for comparison for the remaining regions.

New England: Temperate/Northern Hardwood Forests

The states included in the New England are Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island. The New England region is located in the Northeastern section of United States, all the states except for Vermont have a coastline on the Atlantic Ocean. New England has a harsh climate with long, cold winters and warm, humid summers. Early settlers to the area farmed the Atlantic Coastal Plain, this is a flat area along the Atlantic Ocean; it is very narrow so there were never very large farms here. Other successful areas for farming were the Connecticut River Valley where the soil is very rich, as opposed to the rocky surrounding areas. New Englanders use other natural resources such as lumber, mills, mountains (for recreation), fishing, cranberries and more. New England has been heavily developed in some areas and is still considered to be a manufacturing region. Many mills that used to use water power to grind grain, weave cloth or cut lumber are now factories that produce goods used all over the rest of the country.

The forests of the New England region are of three types: mainly Northern Hardwood Forest and Pine-Oak Forest (Connecticut and parts of Massachusetts). There are a lot of variety in these forests; pine hemlock, maple, beech, oak and birch. The seasons bring spectacular changes to these forests, this region is famous for its brilliant fall foliage, snowy winters and spring maple syrup.

People have had an effect on the forests here. European settlers cut down a great deal of the hardwood for timber. Much of the forests were originally cut down for farming but die to rocky soil and short summers, farming was abandoned and the forests began growing again in the early 1900s. The new forests were not the same as the old forests, now the landscape was fragmented by roads, farms, towns and other developments. Acid rain has also plagued this region because of factories far away, brought by the wind, rain and snow. The acid rain can cause aluminum and other metals to dissolve from the soil into ponds and lakes. Often, living things in the water can be poisoned and affect all the species that depend on them.

The deer is an example of an animal within the habitat that has been effected by the way humans have used the land in New England. The deer is a species that is native to the New England region, it is a primary consumer, and herbivore, deer eat leaves and nuts. They eat plants and their population is controlled by predatorssecond level or tertiary consumers, namely wolves. Currently, deer are the most common wild animals in North America. They live well in the wild countryside, they also survive in the patches of woodland areas and open spaces found in suburbs. Wolves are the deer's natural predator, their niche is to keep the deer population in check. As humans began to settle and clear more and more land in New England, the wolf population dwindled. Wolves live in large areas of wild land away from humans. So many wolves were killed that their population was nearly entirely wiped out, and thus there was no way to regulate the deer population. Deer are still admired for their grace and beauty but are often considered to be pests because they are so prevalent they have consumed all the plants in a habitat and many animals have starved. The food web has suffered an imbalance when the consumer the wolf was removed and many other animals have suffered due to a lack of food.

People have begun to take better care of these forests. Lumber is cut more carefully than in previous years, however it may take a forest hundreds of years to grow bigger. Tourism is an important part of the economy in New England, people from all over the world come to marvel at the beauty of the forests, to visit some of the well-preserved colonial villages and to enjoy outdoor activities (Fielding, 1999).

The Middle Atlantic: Chesapeake Bay

The states of the Middle Atlantic region are New York, Pennsylvania, New Jersey, Delaware and Maryland. Since the early European settlers came, this has been an important region because of its many deep water harbors to shelter ships. Along with the Atlantic Coastal Plains, other landforms are the Great Lakes Plains and the Appalachian Mountains. The ridges of the mountains were not good for farming but the settlers found that lumber and mills were a better use of the land. Early settlers chose to live along the waterways in this region, rivers provided them with a steady source of food and way to travel. Trading posts were set up along the rivers and waterways of this region, food, cloth and tools were all traded. Now, these posts are cities and towns and the Middle Atlantic continues to be linked to other regions through trade. This region is still a supplier of fish and shellfish to other regions of the United States of America.

The horseshoe crab is an animal that lives in this region and plays an important role in the food chain here. horseshoe crabs are found in the Delaware Bay where every spring they venture from the bottom of the bay to the sandy beaches to lay their eggs in shallow nests under the sand. These ancient creatures as adults are rarely consumed, however, the horseshoe crabs lay billions of eggs each spring which are a very important

food source for countless seaside animals. After the horseshoe crab lay their eggs, millions of shorebirds are on their journey north after a winter in South America. Shorebirds stop only a few times to rest and eat, and must feed on the eggs in Delaware Bay in order to make the rest of the trip to their nesting grounds by the Arctic Circle. Many of the eggs are swept away by the tide and are washed ashore by morning.

The blackbird arrives first and eats these uncovered eggs, the eggs are so small that many must be eaten to feed the bird and its nestlings. Next, morning doves and grackle peck at the water's edge where the eggs were washed up until they are chased away by gulls. The gulls crowd together and indulge on horseshoe crab eggs. They have flown from beaches thousands of miles south and are starving for the eggs, they have made it in time. After the gulls more birds arrive: red knots, turnstones, sanderlings, plovers, dowitchers, dunlins, willets, and yellowlegs. These birds are able to dig under the sand to find the hidden pouches of eggs. This can continue for many days, until the next consumer comes swooping out of the sky. A peregrine falcon stalks its prey by watching closely, should a group of birds such as sandpipers take flight, one will surely be caught by the falcon and the food chain continues. Not all of the eggs have washed back to shore, many are still floating in the water where a school of minnows, eel or loggerhead turtles can nibble on the eggs. Crabs and shrimp on the bottom of the also enjoy the green eggs. Bigger fish begin to swim in the shallows looking not only for the eggs but also for the minnow. This movement in the water attracts another predator the great blue heron, who waits patiently in the shallow water to stab a fish with its beak at just the right moment.

Sometimes, even a little mouse scampering along the sand dunes will find an uncovered nest and dine on eggs, even raccoons and fox will eat the eggs. Sometimes the fully grown horseshoe crabs themselves can become a food source. On one of their nightly trip ashore to lay eggs, the water may toss and turn them upside down. This renders them helpless if they cannot turn back over. By daylight, the sun will bake their unprotected underside and the gulls will be back to feed on them, flies will finish the job when the gulls have gone. Sometimes humans will find the horseshoe crabs struggling on the beach in the morning and will turn them right side up so they can retreat to the ocean. The birds by now are strong enough to make the rest of their trip up north and lay their own eggs in the nesting grounds. Surprisingly, despite the seven billion eggs that have already been eaten, many more wait safely under the sand. One night the larvae hatch and are swept into the ocean by the high tide. They grow strong in the bay waters, shedding one shell after another for eight or ten years until it is an adult.

The horseshoe crab is evidently important to not just the habitat of the Delaware Bay but to the habitats that the shorebirds and the songbirds nest. Without the eggs these birds would not have the nourishment they need to continue their trip and they would undoubtedly become extinct. The same can be said for the other organisms that fed off of these eggs, the minnow, shrimp, eel, turtles, and then also the animals that fed off of them: heron, falcon, large fish. These animals are all important to humans as either sources of food, or for maintaining the habitat, without the eggs, humans would lose out on a food source and the habitat would be in jeopardy. Humans can have an effect on this food web by the way the land is used. Many beaches are used for public swimming and recreation which may disturb or destroy the nesting grounds. Also, building along the waterdocks, marinas, piers, etc could make the grounds unsuitable or unavailable for the horseshoe crabs (Crenson, 2003).

The Southeast: The Everglades

The states of the Southeast are Virginia, West Virginia, Kentucky, North Carolina, South Carolina, Tennessee, Arkansas, Louisiana, Mississippi, Alabama, Georgia and Florida. The Southeast's warm climate, miles of coastline and large cities make the Southeast a very popular place to move. The Native Americans farmed the

land, hunted the forests and fished the rivers here. The first European settlements were in this region; the settlers at first had difficulty with farming in this region, but the low level plains with rich soil and the mild climate helped them to prosper. The region began with small family farms but soon there were large plantations. Plantations usually depended on one main crop, a bad year for a particular crop could be devastating for the families and the wildlife. Cotton became a very important crop in the Southeast, the textile industry thrived and continues to be important in the Southeast today. The Southeast is also a very wet place, there are marshes and wetlands in several states. A wetland is an area of land that is covered by water for all or part of the year. One reason the water sits on the land is that the land is so flat that the water does not move. A marsh is a wetland characterized by the growth of nonwoody plants such as grasses. Swamps are wetlands covered by forests with shrubs and hardwood trees like Mangroves. There are four wetlands in the Southeast: Cypress Swamp, Everglades, Mangrove Swamp and salt Marsh.

There is great biodiversity in wetlands such as the Everglades. The variety of species in a habitat is referred to as biodiversity. Wetlands provide many different habitats, plants and animals thrive in the warm climate and moisture. Both terrestrial (land) and aquatic (water) animals can live in a marsh, animals that need the water to survive, frogs and fish, become food for the larger animals, birds and snakes. This is also a resting spot for migratory birds to eat for the trips north or south. The Everglades are unique because they are the only wetlands in North America to have an almost tropical climate.

The Everglades is an area of Florida that is a major source of fresh water for people, as well as a diverse ecosystem for many plants and animals. The Everglades are in the southern part of Florida and look like a grassy swamp. The Everglades is actually a slow moving sheet of water about 50 miles wide and 6 inches deep. When the water seeps into the limestone below, it is pumped out and used in homes and on farms. However, people have begun to build their homes and farms on the edges of the Everglades. They are using the water that flows into the Everglades from streams and are pumping more water out for drinking, cooking, and irrigation. The water supply under the Everglades is dropping and many of the animals there have been dying. Throughout history, wetlands and the Everglades have been overfished, dumped on and drained and filled for homes. Those that are left untouched are often polluted by surrounding developments. Animals and plants are losing their homes or are being poisoned. One of these animals that faces extinction is the Florida panther, a type of cougar. They require a large area for feeding and breeding which has been used for urban structures. As a result there less than fifty panthers that remain making it the most endangered animal in North America. The Florida is a large mammal and a predator. Without predators, other species that the panther preys on will become too prevalent which will have an effect on the habitat.

There are have been many steps taken to save the panther population in the Everglades. Scientists hope that if the Everglades are left at their current size then the panther population will increase. Nighttime speed limits have been lowered, signs have been posted cautioning drivers and fences have been put around major roads and highways so the panthers will not be accidentally hit. Panthers are being bred in captivity and so far ten have been born in this way (Blaustein, 2000).

The Midwest: Prairies and Grasslands

The states of the Midwest are Ohio, Indiana, Michigan, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska and Kansas. The Midwest and Great Plains region is the countries greatest farmlands making it the Breadbasket. A breadbasket is the country's most important region for producing food. The farmers in this region have modern machinery that helps them to produce food to feed thousands of people. The farmers here are thankful for the flat land that is easy to farm, long ago glaciers scraped the

ground flat and left rich soil behind. The Midwest is not entirely flat, a range of mountains in the northern parts of Wisconsin and Minnesota are called the Superior Upland, the Black Hills of South Dakota, where Mount Rushmore can be found, and the Sand Hills of Nebraska. The Mississippi River runs through the middle of the Midwest. The Missouri River joins the Mississippi River 20 miles north of St. Louis, and the Ohio River joins the Mississippi in the southwestern corner of Illinois. Along with the rivers, four of the Great Lakes are found in the Midwest: Lake Michigan, Lake Erie, Lake Huron and Lake Superior.

Most of the Midwest and Great Plains region was once covered by prairies, large, open fields with many kinds of grass and wildflowers and very few trees, they usually grow between mountains and forests. From the Rocky Mountains to the Mississippi River and from Canada to Texas were prairies, today most of that land is used for wheat and corn fields, ranches and cities. More than 100 kinds of grasses will grow on the prairies, such as the Konza Prairie in Kansas. The roots from the grasses can be miles long and form a thick layer of earth where the top soil should be. When the grasses die the roots decay, worms and small insects chew on this and make rich soil for new grass to grow. If the land is used for farming, this process cannot continue and the soil will not stay rich forever, eventually the land will become unsuitable for farming. There are different kinds of prairies, short grass prairies are where little rain falls, these are found at the base of the Colorado Rocky Mountains to the western edge of Kansas. Mixed grass prairies have both tall and short grasses, these are found in central Kansas. The tall-grass prairie is found in eastern Kansas, Iowa, and Illinois; it receives more rain than short- or mixed-grass prairies, there the grass can grow as tall as ten feet high. A prairie's climate changes with the season, they receive very little rain and are very dry. Due to this, prairie fires can begin easily, from lightning often. The fire burns the leaves and stems of the plants but the seeds and roots survive underground and the ashes from the fire give the plants nutrients to regrow. A prairie does not offer animals much protection from the harsh conditions of the weather.

Most of the animals that live on the prairie are herbivores. Large herds of animals feed on certain plants, deer, elk, bison, and pronghorn antelope can graze in the same area without competing against one another. Prairie dogs are an animal that lives on the prairie and are an important part of the food web there. Prairie dogs keep the grasses low on the prairie. Prairie dogs burrow underground and live in big groups called Prairie Dog Towns. They keep the entrances to their burrows cleared by eating away at the plants that might grow over them, they do this so they can see when a predator is going to attack. Predators of the prairie dog are hawks, owls, badgers, foxes, and coyotes. The prairie dogs send some out of the burrow to act as scouts, they stand watch on their hind legs and the others eat. If one of them senses danger, it will bark loudly, or whistle and all of the prairie dogs will have a chance to run for safety in their underground homes. The prairie dog is an important food source for these predators, predators such as the weasel, badger, snake, hawks and owls must compete for the same food, they keep the population of the prey in the prairie balanced.

Prairie land has been taken up by human towns, roads, farming and grazing livestock are all uses for prairie land. Very little land still remains untouched today. Some conservation organizations buy the land and do not allow it to be used, in this way the native grasses and other plants have a chance to grow, and the populations of some endangered animals will be able to increase (Cole, 2003).

The Southwest: Deserts

The states found in the Southwest region are Oklahoma, Texas, New Mexico and Arizona. This sunny region has a varied climate and unusual landforms. The wind, rain and rivers have eroded large areas of rock and soil over time, creating large blocks of land called mesas. Areas of mesas, found in northern Arizona and New Mexico are high in elevation but flat on the surface. There are many canyons here that have been formed by

rivers, the Colorado River, one of the largest rivers in the country, is responsible for forming the Grand Canyon. The Grand Canyon exposes the layers of rock that have built up over millions of years, at the deepest parts of the canyon the rocks may be as old as two billion years. Each layer tells something about the world at that time, from the time of the dinosaurs when there was a shallow ocean over the area, before that large reptiles left their footprints in the sand and below that, fossils from ancient animals and plants.

Although this is a very mountainous region the children will learn about the mountains when doing the Mountain West region, the concentration for this unit will be on the deserts found in this region. Deserts are also found in other regions and stretch from Idaho to Mexico City. A desert is classified as receiving less than ten inches of yearly rainfall and typically have scorching days and frigid nights. The air in deserts is so dry that clouds (water vapor) never really form there, allowing the sun to continually beat down. The deserts in North America are broken into four regions: the Great Basin, the Mojave, the Sonoran and the Chihuahuan Deserts. These deserts are mainly found between the Sierra Nevada Range in California and the Rocky Mountains in Colorado.

Because of the harsh climate in deserts, plants and animals have many different methods to survive here. Plants will have one of two root systems: roots spread close to the surface to absorb morning dew or water from a passing rainstorm, or a very long root system, called taproots, to use water found deep underground. Most animals found in deserts are small rodents such as kangaroo rats or pack rats. They are able to survive here because they eat mainly seeds which are 20 to 50 percent water. Rodents store food in their burrows in case of snow or drought, these burrows also offer protection from predators and relief from the sun. Some desert predators are coyotes, owls and kit foxes. Reptiles found in the desert have adaptations for the heat such as running upright to keep their bodies off the hot sand, changing color to absorb or avoid heat and living underground where the temperature remains about 80 degrees Fahrenheit. Some birds can be found in the desert all year long if they can withstand the heat and find food, others migrate elsewhere if the climate becomes too hot or too cold. Predators, such as rattle snakes, fair well in the desert, there are plenty of insects, rodents and low nesting birds to feed on.

The deserts of the Southwest are experiencing some changes. Desert land, particularly around Phoenix, Arizona is being cleared for homes and shopping centers. As a result the need for water is increasing, to meet this need water is being pumped out of the Colorado River to the extent that only a stream is left by the time it reaches Mexico. Another water source is the underground source the Ogallala aquifer. This is being drained to irrigate golf courses and for other human uses. Underground water levels are dropping to where plants' taproots are not able to get the water they need. An example of a plant with a taproot is the mesquite, when this tree fails to grow the many insects like the grasshopper found in the desert do not have the food and energy they need to reproduce. The insects are food for lizards and some birds who are prey to larger desert birds like the roadrunner which are eventually eaten by coyotes, vultures and decomposers.

The Mountain West: Mountains

The states that make up this region are Montana, Wyoming, Colorado, Utah, Idaho and Nevada. This region has many similarities to the Southwest, both are mountainous and have dry deserts. The Rocky Mountains which go through this region, are young mountains characterized by tall jagged peaks; as a mountain range ages, weather erodes them making them shorter and dull. The Rockies form the Continental Divide, to the east of the Divide, water flows east toward the Gulf of Mexico and the Atlantic Ocean, to the west of the Divide, rivers flow west toward the Pacific Ocean.

The tops of the Rockies are very cold and covered in snow as early as August. This means that the plant and

animals are different as the temperature changes further up the mountains. At the bottom of the mountains are forests, above the forests are meadows, above that only small plants grow in the rocks. Conifers are the trees found further up the mountains, they can hold up in cooler temperatures. Their dark leaves that they keep throughout the year help to absorb heat from the sun, helping the tree to make food quickly and the root system is shallow, well suited to the thin soil found on mountainsides. A tree line is the altitude at which no trees can grow, although smaller, flowering plants can be found here. In the mountains, only warm-blooded animals can survive, they have different ways of adapting to the cold. Some will hibernate, others migrate down the mountain to where it is warmer. Most of the animals are protected by thick, furry coats and layers of fat; another way animals can maintain a higher body temperature in the cold is by having more compact legs, tail and ears; above the tree line live mountain goats and bighorn sheep. Bighorn sheep are well adapted to life in the mountains; they have soft hooves good for walking on the cliffs, they can leap and climb away from most predators and they have well developed senses eye sight, hearing, and smell. Other adaptations of the bighorn is their thick winter coat they shed in the spring, their horns which continue to grow throughout life and their teeth which also continue to grow (the teeth continue to grow due to the diet of tough, gritty grass which wears them down). Despite these adaptations most bighorns live only seven or eight years instead of their possible 18 due to cold, starvation or predation by mountain lions and other predators. Life on the mountain is a delicate balance of survival, overgrazing alpine meadows by livestock and recreational use are threatening this balance. Another threat is the rising temperatures earth is experiencing. As the temperatures rise, this pushes the habitats further up the mountain, those animals like the bighorn sheep who live near the tops of the mountains (where some of the world's rarest wildlife lives) will lose their homes.

The Pacific West: Old Growth Forests

The Pacific West is made up of the states Alaska, Washington, Oregon, California and Hawaii. The Pacific West region has many differences between its states but they are linked together by the Pacific Ocean; studying the states closely allows similarities to emerge. The Pacific West has the most varied climate of any region, from the northern reaches of Alaska to the tropical Hawaiian Islands, many different habitats can be found throughout this region. One ecosystem which is unique to this region are the old growth forests, stretching from Southwestern British Columbia to northern California. This area experiences wet, mild winters and dry, warm summers. Because hardwood trees cannot live in dry summers, old growth forests are coniferous containing: Douglas firs western hemlocks, western cedars and other firs. Old growth forests have developed for hundreds of years without any major disturbances; Douglas firs must be 200 years old before they show any old growth attributes.

Old growth forests have greater diversity in living things than a young forest because of four important features: large, old trees, a multilayered canopy, snags, and large fallen trees. Each of these features creates many different habitats for plants and animals to thrive; the canopy is the top layer where many branches grow at different heights, and the climate is different in the canopy than on the forest floor. Snags are dead trees are still standing, they provide shelter for many animals such as the spotted owl; snags are also important sources of nutrients. Fallen trees begin decaying, the rot provides nutrients for the ecosystem and the log may be home to several small animals.

In the Pacific West, logging is an important industry, this region produces more lumber than any other region. For the past 20 years, loggers have been cutting down old growth forests, a great deal of the forest has been used to build homes and for products people in the United States of America and the rest of the world need. In recent years, tree farms have been created in place of the old growth. These young trees cannot provide the kind of complexity required to sustain many forms of life. One of these is the spotted owl, about 16 to 19

inches long, dark brown with white spots on the body and the wings are light brown with white spots. The spotted owl makes its home in snags and depends on the different layers of the canopy to provide protection from predators such as great horned owls and goshawks. The spotted owls also need the old growth forests for prey flying tree squirrels, red tree voles, etc. found only in the complex structure of old growth forests. The spotted owl is important to the ecosystem because it is both predator and prey, linking food chains into food webs (Snedden, 2005).

Our Regions, Our World

All of the ecosystems, habitats and species mentioned in the discussion of each region maintain themselves by cycling energy through the food chains and food webs. Although geographic distance separates these very diverse habitats, they are not at all isolated. The students may have difficulty seeing how the changes made in one region can significantly impact the ecosystems of another region. The children will probably need some assistance to see how they do have an effect on another. By giving the students one or two examples of how one region relates to another region they will be able to find other relationships on their own. For example, the fishing industry in the New England and the Middle Atlantic supplies fish all over the country, if the Atlantic ocean was over fished there would be a significant loss of a protein source around the country. Another example is when forests are taken down for logging and farming, the animals that once lived there are homeless, they usually die or have to move into surrounding areas. This movement of animals changes and displaces the animals in these surrounding areas. This creates a chain effect which introduces new animals to each other; in many cases these animals have no adaptations to one another resulting in the elimination of some species or changes of others.

Lesson 4

Once the children begin seeing and making connections and relationships within and between regions they are ready to address the essential question head-on. At the end of study for each region the students should write an expository essay responding to the question: How have the food chains in this region affected the way humans live and how have humans affected the food chains of the region in which they live? The first time the students are completing this assignment they will need a great deal of assistance and modeled writing. Use the five paragraph format for expository essays: Introduction, Body Paragraph 1, Body Paragraph 2, Body Paragraph 3, and Conclusion. For the first time, the introduction can be written as a class; the introduction should first include an attention getter to grab the readers interest, however it is wise to begin with writing the thesis for the essay, that is what are they writing about, what they will be explaining. By using a brainstorming technique (webbing, listing, etc.) the students will begin to see which themes and words are used again and again by the class and a thesis statement can be formed. Using the brainstorming, ask the students to highlight with a bright marker the idea that support or explain the thesis statement, each idea will become a body paragraph. An example of this for the New England region: (Thesis) Food chains in the New England region are found in forests, grassy areas, the ocean, streams and ponds, and even our backyards! People here use the natural resources and they can change the way the land looks and the way animals live. (Three supporting ideas) In New England boating and fishing are important industries, Massachusetts grows more cranberries than any other state, and New England attracts many tourists each year.

The three supporting points are main ideas for the three body paragraphs. It is helpful for the students to do some short brainstorming on all three of these points as they will need to elaborate them into a full paragraph. The body paragraphs for the first time can be only three or four sentences long but by the end of the year the students should strive for seven or more sentences per body paragraph. As a class, have the students help take the main points from the introduction and turn them into topic sentences, then take one of the topic sentences and model for the students how to add detail sentences to make a paragraph. The students can then take the two remaining topic sentences and turn them into paragraphs.

The attention getter can be added before or after the body paragraphs are completed. An attention getter can be a sound, feeling, thought, action, question or anything that serves to get the reader to want to read on. An example of an attention getter for the essay about New England might sound like: I love watching the boats sail by the light house while I chase birds on the beach. Or: Crackle, crackle. Under my feet and above my head are beautiful brightly colored autumn leaves. Attention getters create a feeling, they do not have to stick strictly to the thesis and are a great place for children to learn how to use a variety of new adjectives and descriptive verbs.

Once the students have completed the three body paragraphs, the conclusion can be written as a class; restating the theses and three main ideas in different wording and then adding a final zinger. The final zinger adds to the feeling of the paper and leaves the reader wanting more. A final zinger can also relate back to the attention getter but does not have to. An example of a final zinger: Autumn in New England is a great time, in fact I'm about to go apple picking, I can already smell the apple pie cooking!

For each subsequent region, more and more of the writing can be released to the students until by the end of the year, they need no guidance at all. They will become familiar with the format of the prompt and will begin thinking towards this question throughout their studies.

Resources for Teachers

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NY. Examines the forests of eastern North America, the ecosystems and climate.

Rapp, V. (2003). *Life in an Old Growth Forest*. Lerner Publications Company:

Minneapolis, MN. A description of the ecosystem of old growth forests in the Pacific Northwest including Douglas firs and the effects of human involvement in these forests.

Riley, P. (1998). *Food Chains* . Grolier Publishing Company: Danbury, CT. A scientific

look at food chains, herbivores, carnivores, omnivores, and humans and food chains.

Silverstein, A., Silverstein, V. & Silverstein-Nunn, L. (1998). *Food Chains* . Twenty-first

Century Books: Brookfield, CT. This book explains various components of a food chain and discusses food chains and webs, energy flow and humans and food webs.

Snedden, R. (2005). *Habitats: Mountains* . Smart Apple Media: North Mankato, MN.

Describes different mountain habitats around the world and the animals that are characteristic of these ecosystems. Beautiful photography by Corbis.

Snedden, R. (2005). *Habitats: Wetlands* . Smart Apple Media: North Mankato, MN.

Describes different wetland habitats including: marshes, mangrove swamps, swamps, bogs, etc. Beautiful photography by Corbis.

Resources for Students

Berger, M. (1994). *Can Kids Save the Earth?* Newbridge Educational Publishing: New

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and animals survive in the desert and how humans use the desert.

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NY. A story about the life cycle of horseshoe crabs and the birds that rely on them for food sources. The food web of Delaware Bay told with beautiful watercolor illustrations by Annie Cannon.

Kalman, B. & Langille, J. (1998). *What are Food Chains and Webs?* Crabtree

Publishing Company: New York, NY. An introduction to food chains and webs, herbivores and carnivores and decomposers.

Leacock, E. (2002) *National Geographic: Reading Expedition Travels Across America*.

National Geographic Society: Washington D.C. A series of five books looking at the land, economy and culture of the different regions of the United States of America.

Prinlge, L. (2001). *Scholastic Encyclopedia of Animals* . Scholastic Inc.: New York, NY.

A reference book of animals found all over the world with a brief description of habitat. Each animal has a color photograph by Norbert Wu.

Web Sites

Mojave Desert Site [http://www. Desertusa.com/du_mojave.html](http://www.Desertusa.com/du_mojave.html)

Northern Prairie Biological Resource <http://www.fs.fed.us/arnf/png>

<https://teachersinstitute.yale.edu>

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