

## **Native Plants in Backyard Gardens**

*Merry Ostheimer*

*Diverse native plant communities will generate diverse animal communities wherever they are.*<sup>1</sup>

### **Introduction and Rationale**

Located about a mile from the heart of University of Delaware (UD) in Newark, Delaware, West Park Place Elementary School has a wonderfully diverse population of under 340 students that represents ten countries and eleven different languages. West Park Place hosts several programs that include English Language Learner (ELL), Delaware Autistic Program, REACH (Realistic Educational Alternatives for Children with Disabilities), Accelerated Academic, and Montessori. Ninety percent of our ELL students met their goals on the ACCESS (Assessing Comprehension and Communication in English State-to-State for English Language Learners) test.

According to the annual report generated by the Christina School District, out of our total student body, we have about 12% English Language Learners, 56% Eligible for free/reduced meals, and 13% Students with Disabilities. I am a second grade, self-contained teacher and teach multiple subjects that include English Language Arts, Math, Science, and Social Studies. 72% of students were proficient in English language arts (ELA) last school year. 78% of students were proficient in math last school year. This year, my second grade class has fifteen students, three of whom are English Language Learners.

Many students at West Park Place have parents who work for UD or are visiting from other countries to teach or attend higher education UD programs, which creates a bustling hub where education is highly valued. In the fall of 2019, the National Blue Ribbon Schools Program recognized West Park Place Elementary School in its Exemplary High Performing Schools category. West Park Place was one of sixty-eight schools in the nation to be a 2018 National ESEA (Elementary and Secondary Education Act) Distinguished School for the exceptional student performance for two or more consecutive years. In 2015, West Park Place was awarded \$50,000 for closing achievement gaps in Special Education and English Language Learners. In 2011, West Park Place received the National Blue Ribbon School designation from the United States Department of Education for consistent student achievement.

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<sup>1</sup> Tallamy, Douglas W, "Nature's Best Hope" p. 188.

Our instruction is aligned with Common Core State Standards and Next Generation Science Standards. My fellow teachers work with our administrators collaboratively in Professional Learning Communities to analyze student data, set goals, monitor progress, and plan meaningful learning activities. Our practice is to look at beginning year data derived from iReady to respond to students' needs. Based on the Christina School District's annual report, West Park Place teachers are predominantly Highly Effective and Highly Qualified. Our teaching staff has many years of experience with most carrying at least one master's degree. West Park Place Elementary School launched the Leader in Me program last coming year. By incorporating Stephen Covey's 7 Habits for Highly Effective People, the Leader in Me (LiM) program empowers students to practice habits that lead to leadership and positive life skills. West Park has a strong Parent Teacher Association which supports curriculum nights, Scholastic Book Fairs, the 500 Book Challenge, and extracurricular programs.

Delaware Teachers Institute (DTI) is well represented here at West Park Place Elementary School. Since 2014, at least at least one, and up to five teachers have taken part in seminars in a given cohort. Students have been the true benefactors of this partnership between the University of Delaware and Christina School District.

Due to the Coronavirus pandemic, Delaware schools have been closed to the public to the end of the school year. All students learn remotely currently. There are plans to begin a hybrid model later this month, where each class will be divided in two cohorts. One cohort will report on Mondays and Tuesdays for face-to-face learning, while the other will report on Thursdays and Fridays. Wednesdays will be a cleaning day. When a cohort is not in school, they will learn asynchronously at home.

Since January 2019, I have worked with the National Geographic Educator Certification program to promote a more geographically competent world by teaching my students about the world and how it works. For this unit, I plan to teach children about our local ecosystem and how we can influence its health. I plan to look at maps with an ecological perspective to target what native plants with wildlife value grow in the Mid-Atlantic and Middle States Region. I will teach about how healthy ecosystems consist of native plant and animal populations interacting in balance with each other and nonliving things. Using the National Geographic Learning Framework to build an explorer's mindset in my students, my goal is to cultivate a curious attitude in my students and inspire them to want to be responsible to make a change in their own habits and to make their world a better place. I will teach them observation, communication, problem solving, and collaboration skills. Together, we will discover the wildlife in our backyards and learn how to sustain wildlife with native plants.

## Content Objectives

In order to cultivate an explorer's mindset in each of my students, I have encouraged their curiosity each day by reading books and pointing out whether there is a human to world connection in the text. For example, in the story *Teacher's Pets*, students bring pets to school and leave them with the teacher who happily takes care of them. At the end of the year, all the pets are taken back home except for a cricket who goes home with the teacher. The teacher brings the cricket home, releases it in her backyard, and still hears its *chirrup-chirrup* outside her window.

By practicing this habit, I am training my students to look for human and natural world connection. Building their observational skills of how the human and natural worlds interact, my students are immediately engaged in considering how nature plays a part in their everyday life. This next section will focus on local ecosystems and how we can influence their health.

### Ecosystems and Food Webs

I have been reading and rereading Douglas W. Tallamy's book *Bringing Nature Home* and I am happy to say that Tallamy has changed the way I view my backyard and nature. Instead of buying plants because they look nice, fit a color scheme, or are exotic finds, I have learned what plants are native to my area and how they will attract native insects and pollinators to my garden. Each of us has our own ecosystem living in our yard and we have an opportunity to influence our ecosystem's health. We can do this by understanding how the living things in our garden have symbiotic relationships. For example, all flowering plants require pollination. Pollinators such as bees, butterflies, beetles, bats, moths, and hummingbirds provide essential services in nature and are necessary for healthy, productive agricultural ecosystems as they ensure the production of full-bodied fruit and fertile seed sets in many crops.<sup>2</sup>

According to the National Wildlife Foundation Native Plants Finder, native plants are the plant species that are naturally found in your area. These plants have evolved in your region over the course of hundreds of thousands of years and thrive in the local soils, rainfall levels, weather, and climate conditions.<sup>3</sup> Native plants are important because they support local food webs better than non-native plants. Food webs contain several food chains. One food chain might start with photosynthesis from the sun which feeds corn plants which feed grasshoppers, which feed frogs or rats which feed snakes or birds which feed foxes or coyotes. Another food chain might start with sun feeding flowering plants which feed butterflies and bees which feed frogs and birds which feed snakes and

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<sup>2</sup> Native Pollinators.

<sup>3</sup> Bring Your Garden to Life.

larger birds which feed foxes or coyotes. A food web consists of several food chains and how energy is transferred from one organism to another.

When we look at a food chain, we see the order of how one living thing eats and gets energy from another living thing. We can identify who the producers (things that make their own food like plants), consumers (things that eat producers like carnivores, herbivores, omnivores), and decomposers (things that break dead animals and plants and return vital nutrients to the soil) are in our garden. The producers, consumers, and decomposers all have symbiotic relationships and if we use pesticides that kill off insects, then the food chain and surrounding food webs are disturbed. Our flowering plants would die, food chains and webs would collapse, and the physical structure and energy flow of terrestrial habitats would change.<sup>4</sup> This reminds me of the trophic cascade video *How the Wolves Change Rivers* (<https://missionwolf.org/trophic-cascade/>). Wolves, the top predators of Yellowstone National Park, were killed off in the 1900's. By removing the top predator, the prey population increased, which reduced species at the next lower trophic level. When the wolves were reintroduced in 1995, the wolves restored the balance and made the Yellowstone ecosystem stronger and healthier.

Nature works best when it is balanced. There is a mutually beneficial relationship between flowering plants and pollinating bees, or the cat-and-mouse game of predators and prey (p. 25 Monarchs and Milkweed). This next section is about the special relationship between monarch butterflies and milkweed plants.

### Monarch Butterflies and Milkweed

My mantra this summer has been, "If you plant it, they will come." By "it", I mean milkweed and by "they," I mean monarch butterflies. It has been absolutely amazing how my four varieties of milkweed have attracted monarch butterflies! *Asclepias incarnata* (Swamp Milkweed), *Asclepias incarnata* (Ice Ballet Milkweed), *Asclepias verticillata* (Whorled Milkweed), and *Asclepias tuberosa* (Butterflyweed) are all native plants to eastern North America.

The food web for a monarch butterfly includes sun, milkweed plants, caterpillars, milkweed bugs, milkweed beetles, monarch butterflies, frogs, spiders, and birds. I began raising monarchs to help increase their population and what I found was astonishing. Their food web is intense. Predators abound the garden! I have seen caterpillars happily chomping on milkweed leaves one moment and the next moment, they are gone. There are so many factors that affect the survival of a monarch butterfly— First, will a monarch caterpillar egg hatch? Then, will it grow through its five instars developmental stages into a caterpillar? Next, will that caterpillar at its 5th instar form a chrysalis, and emerge

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<sup>4</sup> How to Re-Wild Your Backyard.

from its chrysalis healthy? One great influencer that affects the survival of monarchs is *Ophryocystis elektroscirrha*, a debilitating protozoan parasite that infects monarchs.<sup>5</sup> Monarch butterflies may harbor this parasite as microscopic spores on their bodies. When the spores are spread onto eggs or milkweed leaves by adults, monarch caterpillars eat the spores, which are then ingested and replicate inside them. So, if a caterpillar is very infected with *Ophryocystis elektroscirrha*, it will never complete its life cycle. Sometimes, the infected will fail to emerge successfully from their pupal stage. Other times, they will emerge too weak to survive, or with crumpled wings that will not fully expand. My summer of raising monarchs started with the triumph of finding monarch butterflies in my garden and little caterpillars on my milkweed. But, then it devastated me with an *Ophryocystis elektroscirrha* infestation that hit in the middle of July. After the first couple of butterflies flew away fine, a bunch emerged from their chrysalis deformed or slightly infected. When I realized *Ophryocystis elektroscirrha* had struck, I had to play Dr. Science and euthanize many chrysalises that were stalled in a “black death” and butterflies that were extremely afflicted by the disease.

Here is where my human connection with nature shifted to a new intervention: I started to disinfect the milkweed leaves I fed my caterpillars to kill off the parasite with a bleach solution. The youngest caterpillars that I fed disinfected leaves made it to eclosure and were released! At this point, it was the end of August and monarch butterflies stopped laying eggs. I did, however, find one last bunch of five eggs which I promptly disinfected in a solution of 10% bleach solution. Only one of those five hatched, but that caterpillar went on to eclose perfectly! Over our Zoom meeting, my students and I released him on the last day of summer!

I learned a lot this summer. Although my intentions were good and I wanted to save every egg and caterpillar I saw, I needed to have enough milkweed to sustain them plus any monarch caterpillars left out in the wild. After the peaks and valleys of raising monarchs, we released 22 healthy butterflies. I also learned that disinfecting their food supply was essential to keeping them healthy. This next section will address the importance of planting native species in your garden.

### Building a Healthy Food Web

All species have the potential to sink or save the ecosystem, depending on the circumstances. Knowing that we must preserve ecosystems with as many of their interacting species as possible defines our challenge in no uncertain terms. It helps us to

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<sup>5</sup> Natural Enemies.

focus on the ecosystem as an integrated functioning unit, and it deemphasizes the conservation of a single species.”<sup>6</sup>

Native plants are not the only occupants of our gardens. Destructive non-native and alien plants create a biological void since they are inedible to the majority of native insect herbivores.<sup>7</sup> One tremendously invasive alien plant in our Delaware region is the Oriental bittersweet. It is an aggressive vine that was imported as an ornamental in 1860.<sup>8</sup> Its claim to infamy is that it outgrows the trees it hangs on and smothers them by blocking sunlight and weighing them down so they will fall easily in bad weather. Alien plants have been imported to our country unknowingly with alien insects. One example is a nurseryman from New Jersey who ordered Asian irises in 1916 and received them with Japanese beetle larvae in the roots of the plants.<sup>9</sup> Since this introduction, Japanese beetles cause a lot of damage to grass, plants, and trees. Despite the traps I put out, there is unmistakable damage to the hibiscus or impatiens.

One way we can start controlling alien insects populating our gardens is by planting native species to attract native insects. Insects pollinate 87.5% of all plants, and 90% of all flowering plants. As Tallamy suggests, “Gardeners can and will “change the world” by changing what food is available for their local wildlife.<sup>10</sup> Since caterpillars eat plants which are high in energy, they are very nutritious food. Caterpillars have a high content of protein and fats so they are an excellent source of carotenoids for birds.<sup>11</sup> Birds will be able to feed their young with a juicy caterpillar better than by a beetle that has a tough exoskeleton or an earthworm that is not as nutritious. Caterpillars are good food for birds, so we should find plants that are good for caterpillars to eat. The best resource is the Native Plant Finder <https://www.nwf.org/nativeplantfinder/> First, enter your zipcode and then you will have access to the native plants that host the highest numbers of butterflies and moths to feed birds and other wildlife where you live.<sup>12</sup> I click on native plants to get started and much to my husband’s chagrin is goldenrod, host to **104** types of butterflies and moths! I click on goldenrod and I find its description and the top 15 species of butterflies and moths that use goldenrod as a host plant in my area. Oak trees are the best by far, hosting 464 butterflies and moths.

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<sup>6</sup> Tallamy, Douglas W, “Bringing Nature Home” p. 43.

<sup>7</sup> Rimer, Rhonda L, “Go Native: Conservation of Biodiversity Starts at Home.”

<sup>8</sup> Tallamy, Douglas W, “Bringing Nature Home” p. 86.

<sup>9</sup> Tallamy, Douglas W, “Bringing Nature Home” p. 75.

<sup>10</sup> Tallamy, Douglas W, “Bringing Nature Home” p. 16.

<sup>11</sup> Tallamy, Douglas W, “Nature’s Best Hope” p. 132.

<sup>12</sup> Bring Your Garden to Life.

Native Plant Finder is a useful resource for gardeners as well as classroom teachers. We can use it to teach our students how mutually beneficial host plants are to butterflies and moths. Then we can allow them to plan their own gardens. When we empower our learners, we lead them on a path to independence.

This curriculum unit is a hybrid between a social studies and science project in which my students will study maps of our region and plan a virtual garden that will satisfy all elements of a healthy food web. We will start by looking at maps and talk about how maps show places on Earth using the cardinal directions north, south, east, and west. We will discuss how you can use maps and atlases to find where you live and where you wish to go. Then we will wonder what other kinds of maps there are besides paper maps and we will explore google earth and ArcGIS. This next section will give background information about Geographic Information Systems (GIS).

## GIS Background

*Seeing is not only believing but also perceiving.*<sup>13</sup>

GIS stands for Geographic Information Systems. In my Delaware Teachers Institute seminar *Thinking Geographically: Using Geospatial Data to Encourage Exploration and Ask Probing Questions about Place*, we discussed how GIS provides a framework and process for people to make decisions and take action.<sup>14</sup> According to National Geographic's Resource Library, "GIS can show many kinds of data on one map, such as streets, buildings, and vegetation. This enables people to more easily see, analyze, and understand patterns and relationships."<sup>15</sup> Instead of viewing a one-dimensional map, students can take one glance at an ArcGIS map and see an entire story by looking at a picture layered with information.

GIS uses layers of geographic data so provide a more complete understanding of an area and the issue that is being addressed. The first layer is a base map and subsequent layers add data, sort of like a Layer Sandwich, as we discussed in our seminar.<sup>16</sup> There is an array of basemaps to use that include topographic, dark gray canvas, light gray canvas, National Geographic, terrain with labels, and oceans. The basemap selection depends on how you wish to make your information show. For example, when studying the West

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<sup>13</sup> Brown, Clint, and Christian Harder. *The ArcGIS Imagery Book: New View, New Vision*.

<sup>14</sup> Schorse, Mary, Dr., and Tracy DeLiberty, Dr. "Thinking Geographically: Using Geospatial Data to Encourage Exploration and Ask Probing Questions About Place." April 20, 2020.

<sup>15</sup> National Geographic Society. "GIS (Geographic Information System)"

<sup>16</sup> Schorse and DeLiberty, Seminar, April 20, 2020.

Coast Wildfires of 2020, the basemap is dark gray so the images of the fire really pop out brightly. The contrast of dark to the bright red bursts is effective in showing where the wildfires are. After talking about basemaps, I will show my students how I can see different layers on a map. One such example is Ecosystems and biomes - Upper Elementary GeoInquiries:

<https://education.maps.arcgis.com/home/webmap/viewer.html?webmap=33d2aaf5bdf84c4cf876eb781876e8c2a> . This map uses a topographic base map to reveal biomes identified by particular colors: desert is dark tan, grassland is light yellow, lakes are highlighted blue, rock and ice are white, taiga is purple, temperate forests are highlighted green, tropical forests are green, and tundra is blue. This map also contains pushpins that reveal written information about the particular biomes as they are clicked. A “zoom to” link is available to go closer to that place.

I made the concepts georeferenced data and digital mapping relevant to my students by giving them an assignment through Survey123 called *Windows to Nature*. I wanted my students to ponder these ideas: “What do you see when you look out your window? Notice what plants and trees you see. Wonder what insects might find homes there.” There were six questions in the survey students were asked to complete: Where do you live? What type of building do you live in? How many windows do you have in your house? How many trees can you count when you look outside your window? How did you like taking this survey? What day and time did you finish this survey?

The results immediately popped up as a map layer in my ArcGIS account and I showed my students our local area with their data shown as points on a map. My students were awestruck! They could see the area around our school and points on the map where they lived. Their expressions were delightful when they saw their dot around their neighborhood and deduced that it was their home! I created another Survey123 and asked my students to be explorers in their own backyards by observing and taking photos of animals interacting with plants they see around their home. This time, I used the survey item that required submissions of photos. This was really fun to see what my students posted! There were plants with very small insects, a bunny, and a butterfly.

## **Vocabulary**

In order to help you, your students, and your colleagues use ArcGIS, it would be helpful to have a bank of common language to use. Here are some terms I gathered from ArcGIS and the Teach Engineering STEM Curriculum for K-12 website:

*Basemap*: a reference map on which you overlay data in order to visualize information.

*Direction*: some indication in a map that will communicate to the map user the spatial orientation that the map takes. The most common example is the compass rose.



*Geographic layer:* a set of spatial information that may be displayed in a GIS. Usually the information bits have a theme to them.

*GIS:* stands for Geographic Information Systems. “A geographic information system integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information.”

*Map layer:* a collection of geographic data of one type

*Map information source:* some indication through notes, logo, etc that tells the map reader who made the map, the source of the data which is displayed by the map, and usually the year of its creation.

*Metadata:* data that accompanies a geographic layer which gives extra information such as a description, a source, a spatial reference, an author, and a data structure.

*Pan:* a way to navigate a map by moving right and left

*Pop-up:* little windows of information that open when you click on a symbol on a map

*Scale:* a bar or line indicator of some sort on the map that converts the map’s distance into real world linear distance.

*Spatial information:* any set of information in prose, tabulated, in a database, or any other kind of median that has some location associated with the information.

*Zoom:* a way to navigate a map by moving closer in and out such as when the camera on a map moves either closer to one part of the frame or seems to move through the use of a zoom lens

## **Teaching Strategies**

### Pause and Type

This strategy replaces the classroom strategy called turn and talk. While in Zoom sessions during our remote learning, the Pause and Type strategy encourages students to respond after I have read or discussed something. Students type their thoughts, questions, or responses in the chat of our zoom meetings.

### Sharing Links in Zoom

When I would like my students to follow a link for instruction, I put the link in the chat. After I copy the link in the zoom chat, it becomes clickable for everyone. I have used this strategy for sharing ArcGIS maps and Survey123.

### Notice-Wonder Chart in Jamboard

Jamboard is a Google app that boosts student engagement by accessing engaging editing tools like sticky notes and highlighters. This tool has been very useful for my students to share their *I notice* and *I wonder* comments and start planning for their virtual gardens.

#### Read Alouds

I motivated my students to discover Wildlife and Wild Places by reading with an ecological and geographical lens. I have included books in the bibliography and the part they play in this unit by specifying human impact, ecosystems, foods webs, or butterflies.

#### Maps Study

I planned lessons to cultivate an Explorer’s Mindset by encouraging curiosity by studying maps and viewing the world across local, regional and global scales.

#### Survey123

I built observational skills by going on nature walks and completing surveys on Survey123 and encouraging my students to take pictures of animals interacting with plants. Survey123 is part of the ArcGIS and is a “simple and intuitive form centric field data gathering solution that makes creating, sharing, and analyzing surveys possible in three simple steps: ask questions, get answers, and make better decisions.”<sup>17</sup>

#### Exit Ticket

Using these as a type of formative assessment, I pose a question so that my students can demonstrate their understanding of a concept taught that day.

### **Classroom Activities**

#### Week One: What is GIS?

Read Aloud: *Heal the Earth* by Julian Lennon. This book transports readers around the world on a healing adventure, engaging them to save the environment and love our planet. Using this with Google Earth will be like teleporting to different places and seeing the “where” and asking the hard questions. For example, when the White Feather Flier takes us to the ocean and we see the coral reefs are damaged from coral bleaching, we can ask, “How can we help these reefs recover?” or “What can we do to protect other healthy reefs?”

Map Study: We started by using Google Earth by going to <https://www.google.com/earth/> to launch a search to find our school. I entered our school address in the search bar and showed my class how to use the zoom in and our tools to

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<sup>17</sup> Law, Derek. “5 Reasons to Use Survey123 for ArcGIS.”

start navigating. We talked about what we noticed and the class pointed out a number of features like trees, cars, parking lots, streets, and green spaces. We wondered about how many houses were on a block and how some streets seemed blocked but it is only because it is lined with big, shady trees. After studying the view, I showed my class the globe icon at the bottom right corner and when we clicked on it, we saw the planet. We can click, hold, and drag the planet so it spins and we can see the marker that still shows our school!

Following the Google Earth practice, we opened up an ArcGIS Online map by going to <https://www.arcgis.com/home/webmap/viewer.html?webmap=88685ec7d1ae44a0b2b9e05395491090&extent=-133.921,11.2053,-55.7862,52.6063> and learned how to change the basemaps to give them a different look. Next, we examined the content which shows map layers and turned the layers on and off by clicking on the boxes. This exercise offers another great opportunity to notice things and wonder why many U.S. state capitals are located along U.S. major rivers.

For independent practice, I gave my students a link to an Arcgis Young Learner's Digital Globe which you can find at <https://k12.maps.arcgis.com/apps/webappviewer3d/index.html?id=f0a9845f4cac4f7198307274bcf21b65> . Students can use the zoom in and out and their mouse to click, hold, and drag the mouse to navigate among several types of globes as seen below.

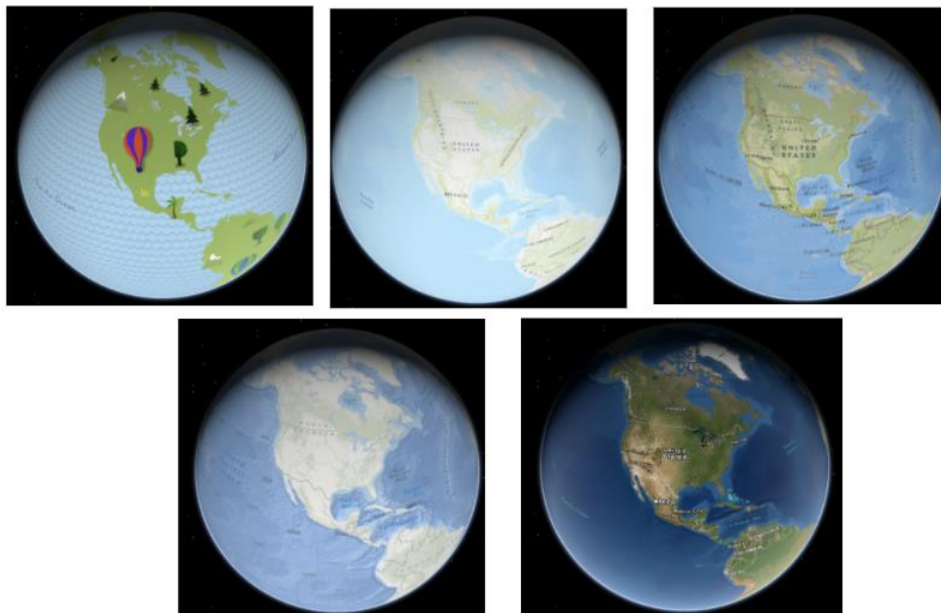


Image 1: ArcGIS Young Learner's DigitalGlobe views: Young Learner, Topographic, National Geographic, Oceans, and Imagery with Landsat. Image credit: ArcGIS.<sup>18</sup>

They can also use the “sun” icon to change the environment by casting shadows on the globe according to the day and time. My students really enjoyed toggling between the types of globes. An exercise that helped my students see the difference between 3D and 2D images was taking a close look at a side-by-side map of Hawaii which you can find at <https://www.arcgis.com/apps/Compare/index.html?appid=6780130fb51c466a93b56a4b5e2f95f0> .

Week Two: Where do you live?

Read Aloud: *Greta and the Giants: Inspired by Greta Thunberg's Stand to Save the World*, by Zoe Tucker and Zoe Persico. This book retells Greta Thunberg's actions as she led a global movement raising awareness about the world's climate crisis. I wanted to bring Greta's story of global change to my students so they could see how they can make a difference on a local scale- in their own backyard. I wondered whether my students have green spaces where they live. Do they have trees or gardens?

Survey123: I wanted my explorers to find their place in the natural world, so I created my first survey called *Windows to Nature* which asked them to look out their windows to count the number of trees they saw. Then I used those answers as information to populate maps which we had a lot of fun looking at. My explorers were very excited to find their own data on the map. We zoomed in and then out and saw how some family members live in different places in the world. Their data could be found in different regions and in one case a completely different place globally- off the coast of Africa!

Another survey I launched was called *Backyard Walk* and encouraged my learners to be explorers in their own backyards by observing and taking photos of the plants they see around their home. After completing this survey, students saw their data points on maps and looked for patterns. There were pictures of insects, caterpillars, cats, butterflies, spiders, and rabbits. We talked about ecosystems and how healthy food webs can be influenced by human interaction.

Week Three: Plan a Virtual Garden

Read Aloud: *Butterflies Belong Here: A Story of One Idea, Thirty Kids, and a World of Butterflies*, by Deborah Hopkinson. With the decline of monarch butterflies, the character in this story decides to make a difference and build a monarch butterfly way station at her

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<sup>18</sup> ArcGIS Web Mapping. ArcGIS.com

school. She researches with her librarian and plans to get “at least ten plants, with two different kinds of milkweed, and nectar flowers for the butterflies to drink from.”<sup>19</sup>

After listening to this read aloud, we will discuss how healthy ecosystems consist of both native plant and animal populations interacting in balance. My students will begin to plan their own virtual garden and for this activity. We will use the Native Plant Finder at <https://www.nwf.org/NativePlantFinder/> to begin planning virtual gardens that will attract butterflies and moths.

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<sup>19</sup> *Butterflies Belong Here: A Story of One Idea, Thirty Kids, and a World of Butterflies*, Deborah Hopkinson.

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## **Appendix: Implementing District Standards**

This unit addresses Geography and Ecology Standards. My students will work on the Geography Anchor Standards One and Four: K-3a. Students will understand the nature and uses of maps, globes, and other geo-graphics and use the concepts of place and region to explain simple patterns of connections between and among places across the country and the world.

It also addresses the Next Generation Science Standards 2. Interdependent Relationships in Ecosystems. Students who demonstrate understanding can develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants and make observations of plants and animals to compare the diversity of life in different habitats.

## **Attachments**

Synopsis



Learning Focused Map

**Endnotes**