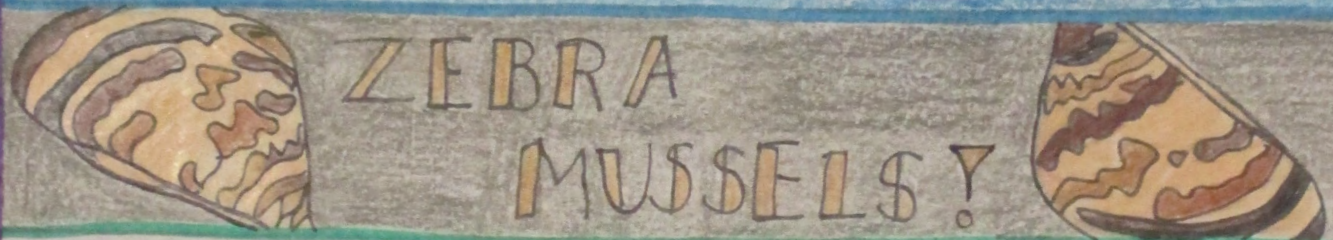


STOP THE MUSSEL!



PROBLEMS:

- * Clams and other native mussels' food, growth, respiratory system, and other characteristics are impacted by the invasive zebra mussels.
- * Zebra mussels inhabit water pipes, occasionally clogging them.
- * Since zebra mussels attach to hard surfaces, they will sometimes weigh down buoys.

SOLUTIONS:

- * Educate boaters and fishermen about zebra mussels to help ensure the species is not carried into more territory.
- * Apply chemical solutions to items the mussels may come in contact with so they don't attach!
- * Use metal scrapers to remove any zebra mussels on hard surfaces.



Cadence



Floating Green Lily pads are attached to the floor of the pond. These plants are from the family Nymphaeaceae. Plants from the family Nymphaeaceae were said to be one of the first groups of angiosperms. Photo by Katie Carpenter



Needles, Cones, and Sap Oh My!
needles point outward
cones curve around the tip-top
sticky sap like glue



Uprooted Roots The roots of trees in the woodlands do not go very deep. Instead, the roots like to extend horizontally to absorb as much water and nutrients as possible. This makes the trees more vulnerable to fall over. Mushrooms grow on the roots; they are actually the reproductive parts of the fungus. Photo by Katie Carpenter

Prairie Shots

Good Things to Know About the Prairie



Annual Fires

Prairies need to have fires every few years to replenish the fertile soil. Since the prairie plants grow from the stem up, starting at the prairie floor, they are able to grow again. If fires never happened in the prairie, succession would take over and the prairie would become a forest.



1/3 - 2/3 Rule

Prairie plants follow the 1/3 - 2/3 biomass rule. This rule means that 1/3 of the prairie flora are located above ground and the other 2/3 is underground. The roots, or 2/3 of the plant, reach deep down into the prairie soil to absorb the moisture located deep into the ground.



Saving the Prairie

Where has the prairie gone? 40% of the United States used to be covered in beautiful prairie land, but now? Almost 99% of the prairie has been destroyed. Since the prairie has such fertile soil, it has been getting cleared for farming. The prairie is also reducing due to over grazing and succession.

Comparing ALL the Ecosystems

An ecosystem is a place where flora, fauna, and the environment interact with one another in a successful manner. There are three different native ecosystems in Wisconsin: the woodlands, prairie, and wetlands. Sadly, much of these influential environments have been lost and damaged. 50% of all woodlands (32 million acres) in Wisconsin has been destroyed to clear land and gain timber, but thankfully 16 acres have been restored since then. The prairie has not been as lucky as the woodlands, losing 99% of all prairie in Wisconsin due to succession and need of fertile soil. The wetlands of Wisconsin have lost 117 acres (53%) of its original wetlands because they have been filled in for area for new buildings.

The climate of southeastern Wisconsin is so diverse throughout one year. There are hot and humid summers, but extremely cold and frigid winters with temperatures anywhere from -26°F to 105°F, all within 365 days. Luckily it's not very windy in Wisconsin, just about 10 to 12 mph winds, but it can endure harsh winds up to 75 mph! There is an average rainfall of 37 inches a year, with 47 inches of fluffy, white snow in the winter-time. The sunlight varies on where you are. For example, the prairies in Wisconsin have absolutely no protection from the sun, but when you are in the woodlands, there is almost no sunlight towards the forest floor because the canopy absorbs majority of the sunlight. The sun beats down at different rates during different parts of the year, but southeastern Wisconsin mainly has a temperate climate.

There are both coniferous (softwood) and deciduous (hardwood) trees in the woodlands. Coniferous trees keep their pointy needle-like leaves all year long. These types of trees are considered to be gymnosperm because the seeds are not enclosed, some are kept as pine cones. These seeds cover the forest floor making up some of the 2 inches of forest litter. The bark of these trees are rough and cracked all the way from the tip of the tree to the forest floor which stores the trees' roots. The roots extend like spilled apple juice to absorb as much precipitation as possible. All trees actually follow the Two-Thirds/One-Third Rule. This means that two-thirds of the towering trees are located above the forest floor while one-third of the tree are the roots, which are under the tree collecting water for a healthy lifestyle. This rule also applies to the deciduous trees that lose their floppy leaves in the fall. The broad leaves are so precipitation can run off and the leaves can absorb as much sunlight as possible. Deciduous trees are angiosperm because their seeds are enclosed in what is called an ovule. The woodlands ecosystem is so different from the other two because it towers over the land it

covers and protects the area from the sun. The woodlands also are making a comeback and actually gaining land percentage by restoration of the forests.

People in deciduous forests have learned to use the forest land in productive ways, but what about the plants and animals? The duckbill platypus is a great example of an animal that lives in the woodlands that has made adaptations to the climate of the deciduous forest. The platypus is from the genus *ornithorhynchus* and from the species *anatinus*. This great animal can weigh anywhere from 1 1/2 to 5 1/2 pounds and can be 26 to 39 inches in length. The back of the platypus is dark brown like dirt while the stomach is a softer, yellow color that helps them camouflage. This starts to lead to the adaptations the duckbill platypus makes to live in deciduous forests. First off, the platypus is really good about species evenness. Adults live in their own territory, but if they feel it is too crowded, they move on to a different area. Also, the males carry venom in the spurs of their ankles to help defend against predators. Some say the venom is so powerful, it can kill a dog! One of the most important assets to the platypus is that their fur is thick enough to keep them warm in winter while their fat tail stores energy. But what do plants do to benefit from the ecosystem? The lady fern is a great plant to use as an example. It comes from the genus *athyrium* and from the species *felix-femina*, but its common name is the northern lady fern. The delicate lace-like leaves of the fern can be 24 to 30 inches long, 6 to 9 inches wide, while the leaves are tapered on both sides. This particular plant is not considered to be endangered. In fact, it is so popular that it is sometimes used for decoration in homes. The lady fern covers the deciduous forest floor, growing in circles. As the circles of ferns increase in diameter, the plants in the center die off. Lady ferns are definitely an invasive species, so it's not surprising how many animals in the forest will be found eating this plant.

The tall grass prairie of Wisconsin is so complex that it finds ways to deal with the rough and complicated climate. Since there is no protection from the powerful sun in the prairies, it makes the ecosystem extremely hot and humid in the summer. In the winter, tall grass prairies have to deal with below freezing temperatures and heavy snow. The fertile soil of the grassland is very dry at the surface due to the sun and strong winds. Lower down, the soil definitely has some moisture from the 30 to 35 inches of rain the prairie receives in a year. The soil in the prairie is nutrient rich and fertile thanks to 2 main things. The first thing is an annual fire. The fire seems like it would actually destroy



Phosphorous Cycle The phosphorous cycle starts out when rain weathers phosphate off of rocks. The trees absorb the phosphate through their roots that get their phosphate from the soil. Animals and people get all of their phosphate from eating other plants and animals. Phosphate is reentered into the soil when organic plants, animals, and humans are decomposed.

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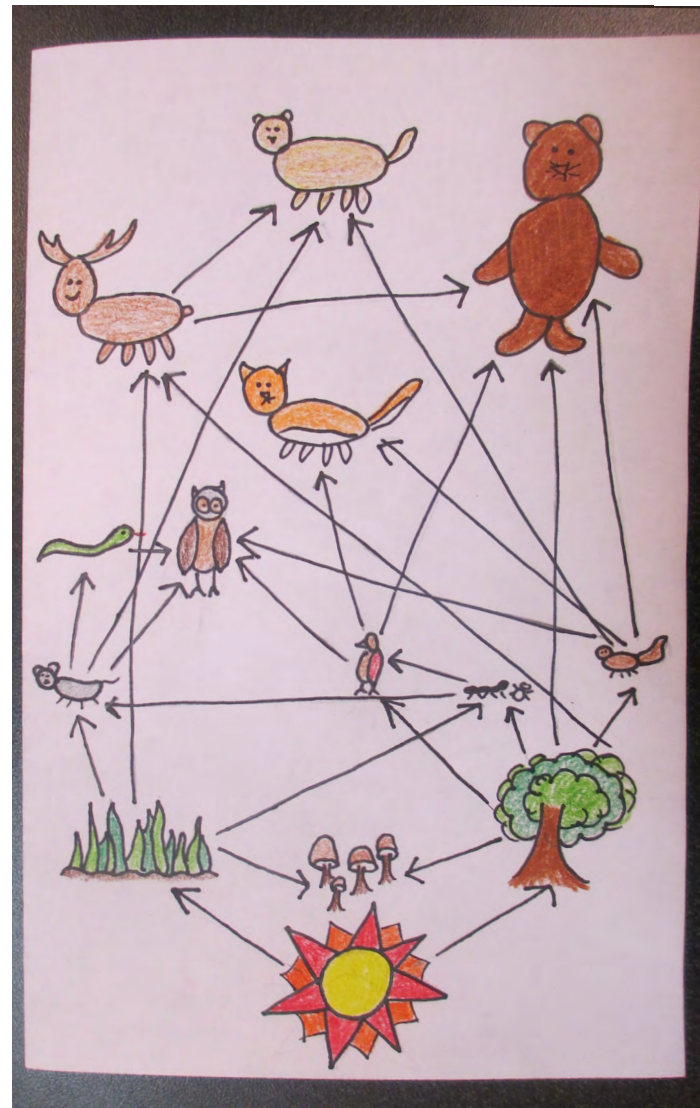
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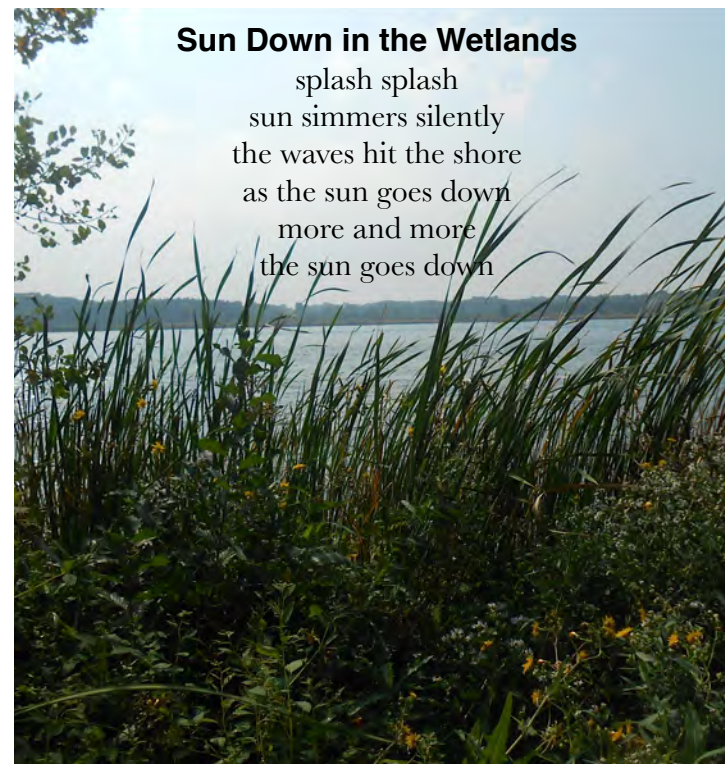
Reaching High The canopy of the forest is the highest part of the deciduous forest. Some of the leaves were starting to lose their leaves and change color to adapt to the colder weather. The leaves changed color before falling because they slowly lose their chlorophyll, which gave them their green color. Photo by Katie Carpenter



Sun & Wind, Wind & Sun
the Wind blows softly
the Grasses wave side to side
intense Sun beats down



Transferring Energy in the Woodlands The sun is the main energy source in any ecosystem, it gives energy to producers that make their own food. Consumers are animals that gain energy from eating other plants and/or animals. Herbivores are animals that eat only plants, carnivores eat both plants and animals, while carnivores stick to eat other animals. Food web by Katie Carpenter



Sun Down in the Wetlands

splash splash
sun simmers silently
the waves hit the shore
as the sun goes down
more and more
the sun goes down



Fruitful Fruits Small fruits are very important to the woodlands because they are a vital food source to small animals and insects. Fruits are spread by animals carrying the encased seeds throughout the forest. These fruits are the holder for the seeds, making the tree an angiosperm. Photo by Katie Carpenter

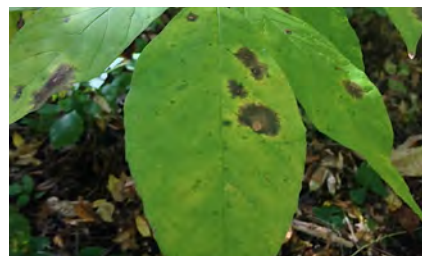
the prairie but the plants are able to grow back thanks to the 1/3-2/3 rule. This rule says that 1/3 of prairie plants are located above ground while the other 2/3 is deep underground absorbing moisture, allowing the plants able to grow from the ground up. If the fires never happen, then succession eventually takes over. This means that the prairie slowly turns into a woodlands ecosystem because the trees have time to grow without getting burnt down. This leads to the second thing that creates fertile soil in the tall grass prairies of Wisconsin. When the plants die in the fire, they are able to be generated into nutrient-rich soil by decomposing the organic material. The tall grasses in the prairie take up 80% of the grasslands, while the other 20% is home to forbs, or beautiful, flowering plants. The fire is the thing that separates the prairie from other ecosystems. If a fire were to ever occur in the woodlands or wetlands, the ecosystem would most likely be ruined while fires actually benefit the prairie.

Plants and animals can not live in any ecosystem without making some kind of adaptations. The milkweed is a great example of a prairie plant that has made adaptations to live in the harsh and dry southeastern Wisconsin. The milkweed plants are long, skinny, and flexible, making it easy to endure the harsh winds. They also have hairy leaves and sap to hold in as much moisture as possible in the parched ecosystem. The American badger is an interesting animal found in the prairie that has found a way to thrive. This badger is mainly nocturnal, meaning most of its activity happens at night time. Unlike lots of other mammals, the badger does not hibernate in the winter, but does become less active compared to the other seasons. Surprisingly, badgers and coyotes found a way to work together while hunting. The coyotes chase the animals above ground and the badgers are underground in their dens leaving little escape for the prey. All the plants and animals in the prairie have made similar adaptations to survive in the prairie.

There are 4 categories of wetlands in Wisconsin: freshwater ponds, bogs, swamps, and marshes. Freshwater ponds are often seasonal, meaning they are only filled with water for part of the year but still maintain fertile and moist soil. This wetland of Wisconsin is not as biodiverse as the other wetlands because it is often separated from other water sources. Ponds get most of their water from underground streams and precipitation. Bogs are similar to the ponds in the way they get their water: precipitation. Bogs form when sphagnum moss and acidic conditions meet, usually in cool climates. This wetland has lots of detritus, or organic material. Swamps are a completely different wetland in the way that they consist of woody plants. The soil is organic and saturated, providing a good base for

trees. Swamps provide an abundant food supply. Unfortunately, the swamps have poor drainage and permeability with standing water. Lastly are the marshes of Wisconsin. Marshes can either be fresh or salt water and are filled with water year-round. The soil is very saturated with lots of mud. Many soft-stemmed plants live in the marsh. All 4 wetlands of Wisconsin have unique hydrology, soil, and vegetation. What would we do without wetlands in Wisconsin? A mangrove tree has had to make many adaptations to survive in the wetlands, just like us. Mangroves often live in water that has high salt concentration, so the trees use their impermeable roots to eliminate lots of salt from coming into the root system, almost 97%! The pneumatophore roots stick out of the salty water to help get the mangrove tree get oxygen. These specialized roots eliminate water and salt from getting in. Since the area in which mangroves grow are not very nutrient rich, the pneumatophores help bring in more nutrients the tree needs to survive. These adapted trees also have waxy or hairy leaves to limit how much water is evaporated from the tree. The biomass rule in the wetlands is 1/3-2/3, meaning one-third of the plant is above ground while the other two-thirds of the plant are below ground to hold on to soil to protect against strong winds and to search for oxygen. Dabbling ducks are a common kind of waterfowl found in the wetlands. These ducks have made many adaptations to help them survive, such as their pecten beak. This beak is like a comb, it filters the water out of the duck's mouth to trap the food in their mouth. Their helpful beak also helps cleanse their beautiful feathers and hold slippery food items. These well-adapted animals do not go deep into the water, usually just eating small animals and hydrophytes along the water's surface. Ducks also migrate south for the winter so the weather is warmer and more comfortable for them to live in. It's amazing how easily the ducks make it look to adapt to such a complex ecosystem like the wetlands.

All ecosystems are important in their own way because they all provide essential characteristics to our planet. In southeastern Wisconsin, the woodlands are important because they produce and provide lots of fresh oxygen, timber, and jobs. In the prairies, there are over 60 species of grass, 300 different types of flowers, 100 kinds of lichens, and vast fauna. They provide southeastern Wisconsin with very fertile and nutrient rich soil. Last but not least are the wetlands. The wetlands are truly extraordinary in the way that they can hold 1 to 1.5 million gallons of floodwater in just one acre! They also help clean and filter water that comes through their land, which happens to be the most diverse biome in terms of fauna.



**Compare & Contrast
Deciduous and
Coniferous**



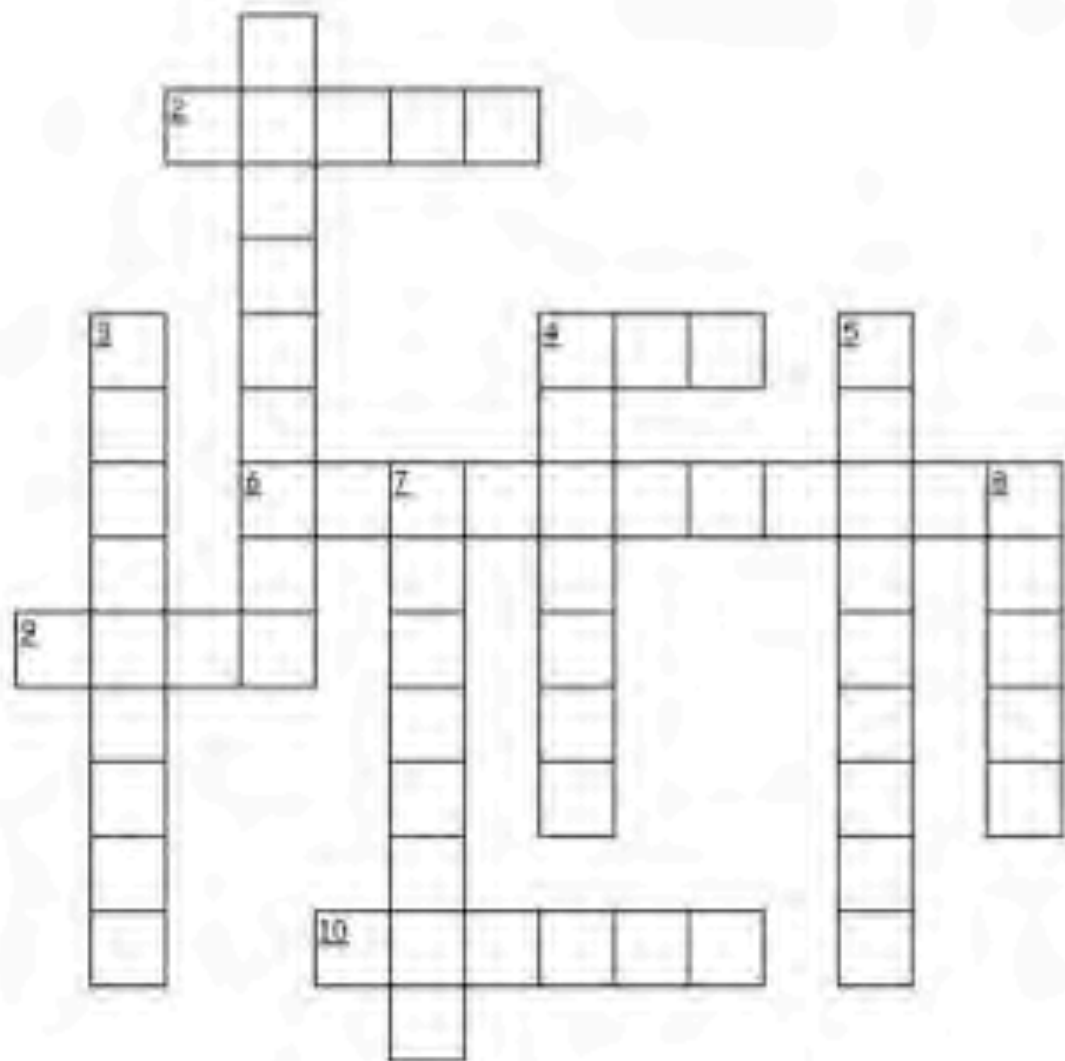
Deciduous

- also referred to as "hardwood" trees
- leaves are broad and floppy and fall off the trees in fall to grow back in the spring
- are angiosperms, meaning the seeds are kept in fruits and/or flowering plants

Coniferous

- also referred to as "softwood" trees
- leaves are needle-like and stay on the tree year-round
- are gymnosperms, meaning the seeds are kept in acorns/cones

Wetlands Vocabulary Cross -Word Puzzle



- Across**
- 2. a tract of soft wetland usually characterized by monocotyledons
 - 4. wet muddy ground too soft to support a heavy body
 - 6. a plant that grows in water or very moist ground; an aquatic plant
 - 9. a body of water usually smaller than a lake
 - 10. something that drains or flows off

- Down**
- 1. the ridge or crest line dividing two drainage areas
 - 3. a science dealing with the properties, distribution, and circulation of water
 - 4. the amount of living matter in a given habitat
 - 5. large aquatic birds
 - 7. non-living, organic matter
 - 8. a wetland often partially or intermittently covered with water; especially one dominated by woody vegetation

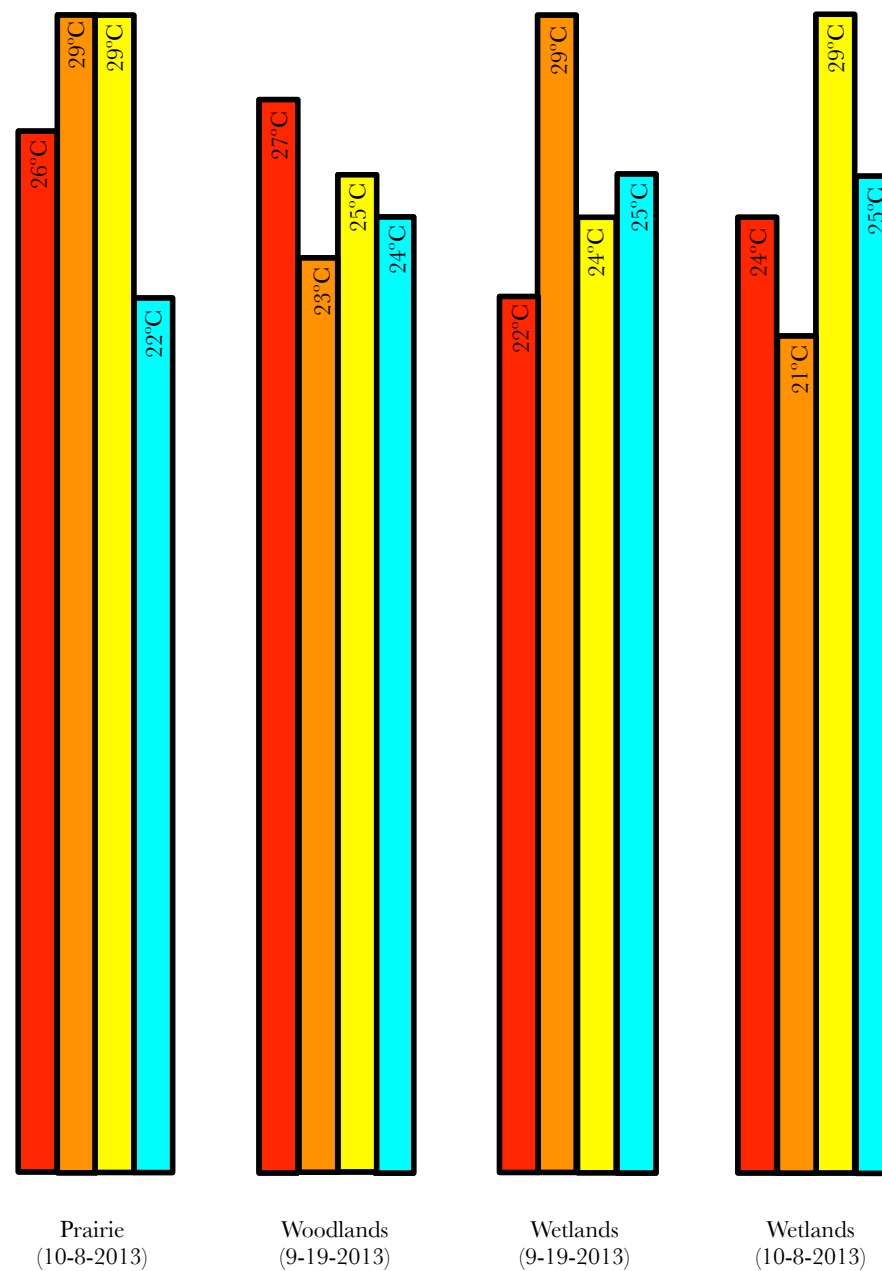


Changing of Seasons In the fall, the leaves and petals start to die off. Flowers bloom in the early spring, before the leaves bloom. The leaves are nonexistent during the winter because they can't endure the long, cold weather. Photo by Katie Carpenter

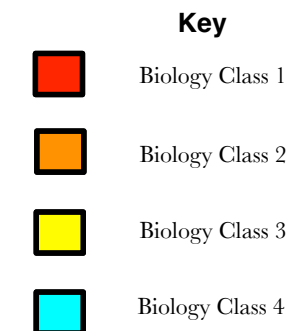


Watch Your Step! The forest floor is covered with litter from the surrounding trees including branches and leaves. Deciduous trees are considered to be hardwood. The forest has six different layers- forest floor, herb layer, shrub layer, understory, canopy, and emergents. Photo by Katie Carpenter

Air Temperature in the Prairie, Woodlands, and Wetlands from All Biology Classes



Air Temperature in the Prairie, Woodlands, and Wetlands from All Biology Classes



What's the Difference? The ecosystems in southeastern Wisconsin (prairie, woodlands, and the wetlands) are all very similar when it comes to air temperature. The average prairie temperature between all 4 biology classes was 26.5°C. The woodlands had an average of 24.75°C. The first wetlands area that the classes investigated had an average air temperature of 25°C while the second wetlands environment had an average of 24.75°C. Since all ecosystems were found in southeastern Wisconsin, the temperature didn't vary widely.



Helpful Winds The wind disperses the seeds of the milkweed. Milkweed plants also spread through their roots, which are called rhizomes. The milky sap located in milkweeds can be hazardous to certain insects and animals. Photo by Katie Carpenter



Way Up High towering trees way up high wave smoothly from side to side their petioles point towards the sky as they help the ambitious animals hide