

The Impact of Climate Change

2020 Phenology Calendar

Art and Writing by OWL's
Class of 2024



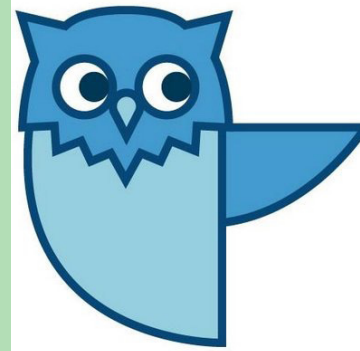
Foreword

As the seventh graders at Open World Learning Community (OWL) began to explore the question, “What makes a community thrive or suffer?” their studies extended beyond the sphere of human community. During fall field work, students tromped through Minnesota prairies, deciduous forests, and coniferous forests of Belwin Conservancy and Katherine Ordway Field Station with our community partners at the National Park Service and Mississippi Park Connection. Thermometers and photometers in hand, the students sought to discover what makes ecological communities thrive or suffer. In the field, we analyzed the living and non-living components of each of Minnesota’s ecosystems and collected native prairie seeds. Students had opportunities to get to know Minnesota’s wild species in person, and by the time snow flew, everyone had selected their own Minnesota species to research throughout the year.

Back at school, students planted the seeds they gathered, along with the seeds of a climate-change-hardy tree, the Kentucky coffeetree. While the seedlings emerged in the greenhouse, students created balsa wood carvings of their species in art class, engineered electrical circuits modeling the flow of energy in ecosystems, and conducted research on the seasonal activities, or phenology, of their species. In early spring, students traveled to Como Outdoor Woodland Classroom to photograph their species. By the time the young plants were ready to plant at Indian Mounds Regional Park, students were synthesizing their learning by writing about the impact of climate change on their species’ phenology.

This calendar showcases how each seventh grader at OWL experienced climate change as an immediate, local, and personal phenomenon as an influencer of a Minnesota species they came to know through outdoor experiences, artistic interpretation, and scientific research.

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Siberian Squill
Scilla siberica

By Eli Berg

This year's Phenology Calendar artwork and paragraphs were made by the 2018-2019 7th grade Life Science students of OWL. Each student researched and illustrated one Minnesota species, paying attention to how their species was impacted by climate change. In the process, the Class of 2024 discovered the phenology, or seasonal events, of their chosen species.

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This calendar is a part of the 7th grade expedition: Community. The Guiding Question: How does a community thrive or suffer?

Our first fieldwork of the year was to Baker over Fall Fieldwork as a chance to see species in nature and maybe select a species. Later that week, we went to Belwin to figure out the underlying abiotic factors of each of MN's biomes. We harvested little bluestem seeds for the people at Belwin as practice. This was important because later we went to Katherine Ordway Field Station, where we harvested big bluestem and indian grass seeds. We later planted them in the greenhouse, along with Kentucky coffeetrees. Skipping ahead to the end of the year, we went to the Como Outdoor Woodland Classroom to take photos for the phenology calendar. At Indian Mounds Park, we planted the big bluestem and indian grass that had grown in the greenhouse, though not the Kentucky coffeetrees, in the prairie there.

In Quarter 1, we started on the phenology calendar by choosing our species. In art, we did carvings of our species with balsa foam, a sample of which you can see in August. We put the phenology calendar on hold until Quarter 4, when we did much more detailed research on our species and wrote the paragraphs in ELA. In order to learn more about climate change, we also wrote 60 word pop-ups about how the average citizen can combat climate change.

- The 7th Grade Phenology Calendar Team



The fisher (*Pekania pennanti*) is a carnivorous member of the weasel family. The fisher is sometimes called the fisher cat, but this is misleading, as it is not a member of the *Felis* genus. Fishers live mostly in Canada and the northern U.S. This species is listed at least concern on the IUCN conservation status list. At this moment, fishers are not our most pressing problem, but if we don't at least slow climate change down, the forests that this animal calls home will disappear, and the fisher will go extinct.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			01 Winter Break Kwanzaa New Year's Day	02 Winter Break	03 Winter Break	04 Winter Break
05 Winter Break	06	07	08	09	10	11
12	13	14	15	16	17	18
19	20 MLK Day (No School)	21	22	23	24 Teacher Development (No School)	25
26	27	28	29	30	31	

January

Fisher

Pekania pennanti

By Mintesinot Sturm

January 5 Photo: Common Juniper, *Juniperus communis*, by Adler Heeringa



The beaver (*Castor canadensis*) is known as the animal engineer. They're the largest rodents, and their diets consist of plants. Their teeth, an orange color with a protective layer, grow throughout their entire lives. Beavers live in the wetlands, but also in chewed down trees to make dams or lodges, their homes. Beaver dams also naturally release carbon dioxide, and raise water levels, dissolving the carbon dioxide from the soil. Sometimes, the carbon from the trees gets used by other plants. Dams also slow water, giving carbon a chance to sink into the soil. But beavers don't just help the environment. They help humans too. Beaver dams can filter water pollution, and reduce erosion. Beavers are not only the engineers of the ecosystem, helpful to other animals, plants, and humans, but beavers can even help slow or sometimes reverse climate change.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						01 
02 Groundhog's Day	03	04	05	06	07	08 
09	10	11	12	13	14 Valentine's Day	15
16	17 President's Day (No School)	18	19	20	21	22
23	24	25	26	27	28	29

February

Beaver
Castor canadensis
By Maria Imholte

February 1 and 8 Photo: 7th Grade Group at Katherine Ordway, by Megan Hall



Minnesota is one of the few states to have moose (*Alces alces*). During early summer, moose feed on water plants in ponds and along lake shores. However, due to climate change, some moose don't eat during the summer and forage right before winter. The heat is killing some of the vegetation and the moose can't make it through the winter. Without these moose eating lots of vegetation, the natural balance in the food chain would be disrupted. The population is going down enough to disrupt the food chain.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01	02	03	04	05	06 Conference Prep (No School)	07
08 Daylight Savings	09	10	11	12	13	14
15	16	17 St. Patrick's Day	18	19	20  Spring Equinox	21
22	23	24	25	26	27	28
29	30 Spring Break	31 Spring Break				

March

Moose
Alces alces

Art by Jonah Pfoser, Paragraph by Zander Sachs

March 20 Photo: Bluebell, *Hyacinthoides nonscripta*, by Hiroko Zeleke



The northern yellow-shafted flicker (*Colaptes auratus auratus*) is a subspecies of the northern flicker, identifiable by the flash of yellow under its wings, that lives in eastern North America. Due to climate change, flickers are spending more time in the northern parts of their range (in Canada) and less in the southern edges. Minnesota is part of their year round range. The flickers can stay where they are because it's not too cold. And while this may be cool for birdwatchers, it's not a good sign for either climate change or the flickers.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			01 Spring Break April Fool's Day	02 Spring Break	03 Spring Break	04
05	06	07	08	09	10 Good Friday Teacher Develop- ment (No School)	11
12 Easter Sunday	13	14	15	16	17	18
19	20	21	22  Earth Day	23 Ramadan Begins	24	25
26	27	28	29	30		

April

Northern Yellow-Shafted Flicker

Colaptes auratus auratus

By Violet Wright

April 22 Photo: White Oak, *Quercus alba*, by Willa Champion



The wood turtle lives throughout eastern Minnesota and the north eastern United States. Also known as *Glyptemys insculpta*, the wood turtle belongs to the genus *Glyptemys*, along with the bog turtle. The wood turtle is named because of the rings on its back that look similar to tree rings. With warming weather and climate, their habitats are changing and shifting farther north. Controlled waterways and development prevent wood turtles from traveling farther north with their shifting habitat. As these changes become more rapid, wood turtles are unable to adapt to habitat changes. Wood turtles are an essential part of their ecosystem.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					01	02
03	04	05 Cinco de Mayo	06	07	08	09
10 Mother's Day	11	12	13	14	15	16
17	18 Interim	19 Interim	20 Interim 	21 Interim	22 Interim	23 Ramadan Ends
24 31	25 Memorial Day	26	27	28	29	30

May

Wood Turtle
Glyptemys insculpta
 By Willa Champion



The tamarack (*Larix laricina*, also known as the eastern larch) lives in the coniferous forests of northern Minnesota, as well as the Great Lakes region up into Canada. However the tamarack is not a coniferous tree, it is a deciduous tree. The tamarack is the only deciduous tree with needles. As climate change becomes a bigger concern through Minnesota the tamarack is beginning to become scarce in the coniferous forest. The eastern larch beetle uses the tamarack as a host. With warming temperatures, more beetles are able to survive, and adult beetles can have longer mating seasons. The plethora of beetles kills the tree. With the devastating effects of the eastern larch beetle on the tamarack, we need to take action. In the long term we have to bring Minnesota's temperatures back down. Citizens can do this by lowering the amount of carbon emissions and fossil fuels they use. By doing this we can help save the unique species of the tamarack.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	01	02	03	04	05	06
07	08	09 Last Day of School	10	11	12	13
14	15	16	17	18	19	20  Summer Solstice
21 Father's Day	22	23	24	25	26	27
28	29	30				

June

Tamarack
Larix laricina
 By Tess Champion

June 20 Photo: Dandelion, *Taraxacum officinale*, by Hazel Wright



The painted turtle (*Chrysemys picta*) is an animal with an interesting trait that could make global warming a problem for them in the future. The sex of the babies is determined by the temperature of the egg during their time underground. As it gets warmer, more of one sex is produced and vice versa. This issue could also affect hundreds of other species, melt the ice caps, and ruin our planet. Global warming will affect humans and animals alike. We need to make sure our planet stays healthy.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			01	02	03	04 Independence Day
05	06	07	08	09	10	11
12	13	14	15	16	17 	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

July

Painted Turtle
Chrysemys picta
By Aidan Jewell

July 17 Photo: Wild Pansy, *Viola tricolor*, by Eddison Vang



Tamarack
Larix laricina
By Cooper Peterson-Antin

The trumpeter swan (*Cygnus buccinator*) is a bird that lives by swamps, lakes, and ponds. The way that the season changes from winter to spring can flood their homes. This will have a huge impact on where they can live, and the toxins that go in the water can poison them.

It's not the birds themselves that are endangered, it's the places that they live that are at risk. As those areas disappear, so will the swans that nest there. According to a study by the National Audubon Society, if temperatures in the state continue to climb at the current rate for 65 years, it will drive many species that live in Minnesota farther north in search of better environments. Most species of birds can't adapt to changes in their habitat. On top of that threat, the lead used in fishing gear is poisoning trumpeter swans. If people want to do something to help the trumpeter swan, they can start requesting nontoxic fishing tackle. It exists, and it works just as well as the ones with lead.

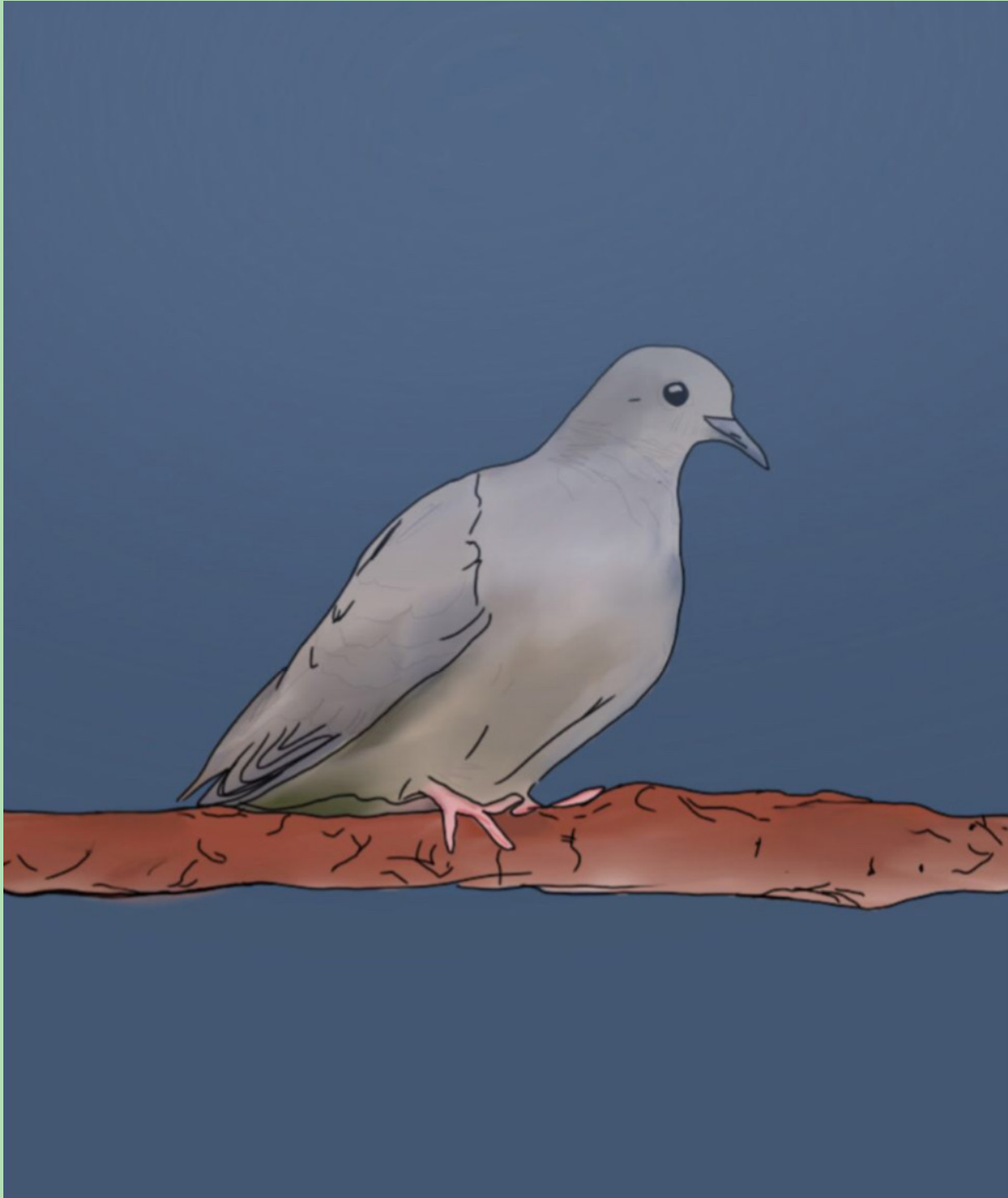
If this keeps up, the swans, as well as other bird species, could lose their homes and they may not return to Minnesota. The study also warned that the trumpeter swan could disappear from Minnesota entirely.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						01
02	03	04	05	06	07	08
09	10	11	12	13	14	15
16	17	18	19 	20	21	22
23	24	25	26	27	28	29
30	31			First Day of the MN State Fair		

August

Trumpeter Swan
Cygnus buccinator
By Grace Moua


August 19 Photo: Southern Magnolia, *Magnolia grandiflora*, by Mira Iwaszek



Mourning doves (*Zenaida macroura*) are migratory birds. However, some will be seen year round in southern Minnesota because not all mourning doves migrate. Mourning doves migrate at the same time every year, but as the climate changes, conditions change, and they can't survive. The change in climate also causes habitat loss. The bird population has already been decreasing because of climate change or related issues. Long distance migrants such as mourning doves have declined much faster than resident species because they are unable to adjust their migration schedules to find food sources. Balance between birds and their ecosystem is important but now, as the climate is changing, more and more species are in danger.



Red Oak, *Quercus rubra*, by Mira Iwaszek

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01	02	03	04	05
06	07 Last Day of the MN State Fair Labor Day	08 First Day of School	09	10	11	12
13	13	15	16	17	18	19
20	21	22  Autumn Equinox	23	24	25	26
27	28	29	30			

September

Mourning Dove
Zenaida macroura
 By Sarah Westawker

September 22 Photo: Red Maple, *Acer rubrum*, by Anna Nowatski



The jack-o-lantern mushroom (*Omphalotus olearius*) is a decomposer. Poisonous to humans, this easily seen orange mushroom glows in the dark. If it gets too cold, the mushroom could freeze off the stump it grew to. Climate change is causing the seasons to get more intense. This means if the winters get too long and cold, they could freeze and die. In the summer, the top of the mushroom could get so hot, insects and small animals would not want to eat them, so it could overgrow and die. This is important because this is an extremely cool plant that feeds a lot of insects and animals, and if they are destroyed by heat, or extreme cold, animals and insects could starve.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				01 	02	03
04	05	06	07	08	09	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31 Halloween

October

Jack-o-Lantern Mushroom

Omphalotus olearius

By Avery Erb

October 1 Photo: American Bison, *Bison bison*, by Hiroko Zeleke



Climate change is negatively impacting many species in Minnesota including the red-tailed hawk. The red-tailed hawk (*Buteo jamaicensis*), a raptor commonly found in North America, has stopped flying southwards during winters due to climate change and land use. This has prompted Neil Paprocki and his colleagues from HawkWatch International to count the bird population afresh after initial apprehensions that their numbers had dwindled. One impact is the effect an increasing number of northern birds has on the lower trophic levels. Paprocki states “If a greater proportion of birds are wintering further north, this may result in increased predation on primary prey species such as mice and voles.” This will lead to more competition for food for the red-tailed hawk.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01 Daylight Savings	02	03	04	05	06	07
08	09	10	11 	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26 Thanksgiving	27 Black Friday	28
29	30					

November

Red-Tailed Hawk
Buteo jamaicensis

By Santiago Johnson


November 11 Photo: Aster, *Asteraceae*, by Elena Davis



The long-tailed weasel (*Mustela frenata*) is a small type of weasel that lives in much of North and Central America. Its habitat is woods, crop fields, and suburbs. Long tailed weasels live in things like rock piles or hollow logs, or underneath barns. They eat things like small rodents like chipmunks, voles or rabbits. The long-tailed weasel is being affected by climate change because their habitat is changing. Warmer temperatures change the types of plants that can live in an area and this can then change the types of prey that are in an area. Also, long-tailed weasels use camouflage; during winter their fur is white and during warmer weather it is brown. This helps them not stand out against the ground. When the temperature gets warmer, winter might be shorter and the white fur might make the long-tailed weasel stand out and they would be vulnerable to predators.



Eastern White Pine
Pinus Strobus
by Tess Campion

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01	02	03	04	05
06	07	08	09	10 Hanukah Begins	11	12
13	14	15	16	17	18 Hanukah Ends	19
20	21	22  Winter Solstice	23	24 Christmas Eve	25 Christmas Day	26 Kwanzaa Begins
27	28	29	30	31 New Year's Eve		

December

Long-Tailed Weasel
Mustela frenata
 By Roya Slinger

December 22 Photo: Eastern White Pine, *Pinus strobus*, by Tess Campion

2020 Phenology Calendar



January



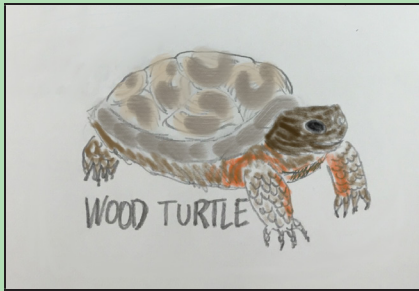
February



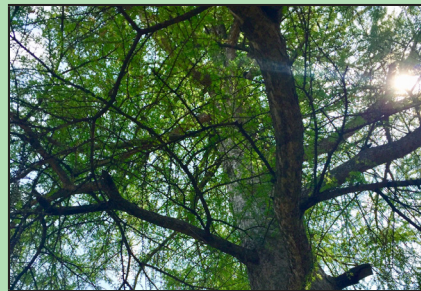
March



April



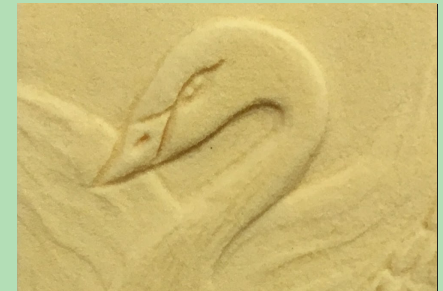
May



June



July



August



September



October



November



December