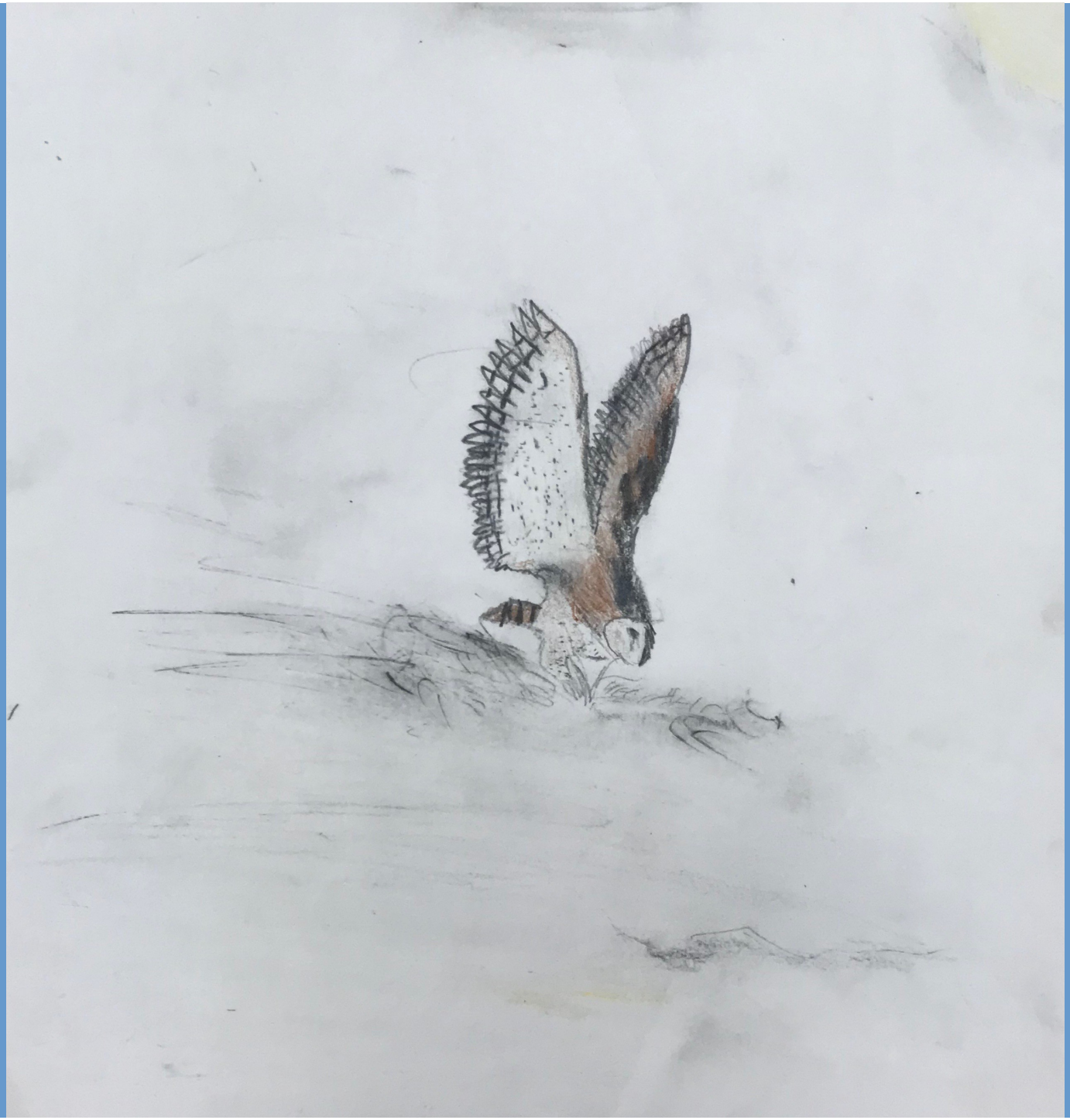

2019
Phenology Calendar
2017-2018 OWL 7th Grade Life Science Students

Eastern Bluebirds are magnificent birds that are a part of Minnesota's ecosystem in the summer. Although these birds only come to Minnesota during the summer, they are greatly affected by climate change in Minnesota as well as all over the country and continent. Seeing one is rare this is because of the climate change, making it hard to for the birds to reproduce. Which has resulted in Eastern Bluebirds becoming endangered species. The most unique thing about these birds is the way they sing. It's unlike most other birds, because of humans the Eastern Bluebirds song has been altered due to anthropogenic noise, that they mimic. Most birds including the Eastern Bluebird are advancing the time they lay their eggs shorting the time between when they migrate south and the time they migrate North to lay eggs. This affects how many eggs are hatched and if those baby birds survive. Climate change affects the birds directly but it also affects the area in which they live. Humans are cutting down forests and green space in order to build homes and businesses this then makes it much harder for Eastern Bluebirds and many other types of birds to find homes. Resulting in fights for territory and the lack of reproduction which ties into more endangerment of these species and possibly extinction all together. In conclusion Eastern Bluebirds are being negatively affected by climate change and it is mostly due to humans.

Art and paragraph by
Ellison Northrop - Kiel

January 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		



So far climate change is affecting a lot about the world, but the barn owl not as much. The major barn owl enemy right now is rodenticides and pesticides. We have seen a decrease in the population of these ghoul-like owls, because they are such ferocious rodent-eaters, and the rodents they are eating are contaminated with rodenticides. Barn owls are often found living in silos and barns, in which they are very welcome. They keep pesky mice and rats away, so in a way they are an all-natural rodenticide. Now however, with the use of rodent killing chemicals these owls are being poisoned by the food that they eat. A way they are directly being affected by climate change is the longer winters. The Audubon Society predicts winters to expand nearly a quarter by 2080 which could aid in a decrease in barn owl population. This is due to the fact that they normally expect first egg in late march and early April. In the past they were expected to have their first egg around early march, it is now pushed back to late April.

Art and paragraph by
Otis King

February 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

The Eastern Cottontail, scientific name, *Sylvilagus floridanus*, lives in all biomes of Minnesota. They like to be in tall grass and live in the meadows. This is why they live in all biomes. They eat twigs and bark, in the spring and summer they eat the berries and leaves of maple trees and fruit trees. In the winter they can no longer eat the berries and fruit from the trees because it dies, so instead they eat the twigs and bark because they like the sweetness of the bark. During the winter and spring, Eastern Cottontails are preyed on by coyotes. This makes the population decrease. Overall the climate affects the rabbit because it kills the rabbits food and it's the season when coyotes likes to hunt.

Art and paragraph by
Lucy Annis - Bercier

March 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

The porcupine (*Erethizon dorsatum*) lives in the coniferous forest. In the winter, it does not hibernate but it does sleep in and stays close to its den. In the warmer seasons it is very active at night because it is nocturnal. It also eats a lot of leaves, buds, fruits and twigs. The porcupine is a herbivore so it does not eat meat. Porcupines have sharp quills to ward off predators but they cannot shoot the quills from their back. Porcupines are affected in a lot of different seasons, in summer it often rests in trees and tries to stay as cool as possible.

Art and paragraph by Samantha O'Hara Graff

April 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

The red fox is in the dog family, which scientists call *Vulpes vulpes*. The red fox is a carnivore which means it eats both meat and plants. The red fox eats crayfish, fruit, and berries. It also eats squirrels, rabbits, mice, or small bugs like crickets, grasshoppers. Climate change is affecting the red fox by some of the food they eat . Like the rising heat is getting rid of water which is destroying the crayfish habitat. Some places there isn't been a lot of rain and the plants have no water to drink .

Art and paragraph by
Jude Witt

May 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

The Asclepias syriaca (common milkweed) is an important part of an ecosystem because it helps organisms live. Milkweed is affected by climate change because the milkweed needs to function in a warm climate with cool breezes. Milkweed is most active in the summer months. Milkweed has many different functions for different organisms. It helps butterflies mate and feed. Climate change has a negative effect on milkweed because the change of climate would make it more difficult for the milkweed to function and reproduce. Climate change effects the milkweed because it needs a warm place to grow and produce to monarch butterflies and the milkweed needs a warm place to grow with a wind flow.

Art and paragraph by
Anders Mork

June 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

The American Toad or the *Anaxyrus Americanus* (Latin) has a pretty busy schedule. In the winter it hibernates in a small burrow just below the frost line until spring. Then in the spring it wakes up to the bright warm sun and feeds on insects trying to make up for the months of sleep with no food whatsoever, but the biggest activity in the spring for the toad is breeding. Each male will look for a mate to breed with. Once this happens the females will lay their eggs. The eggs will hatch into tadpoles a few weeks into the summer and then spend the rest of the summer feeding, sleeping, escaping from predators, and growing into young adult toads. Luckily because of their bad tasting skin they have very few predators and many survive for a pretty long time. In the fall the toads will roam around on their new legs feeding, escaping predators, and preparing themselves for a long winter of hibernation. This is the everyday life of a toad or as I like to call it the toad cycle.

Art and paragraph by
Owen Vaughan - Fier

July 2019

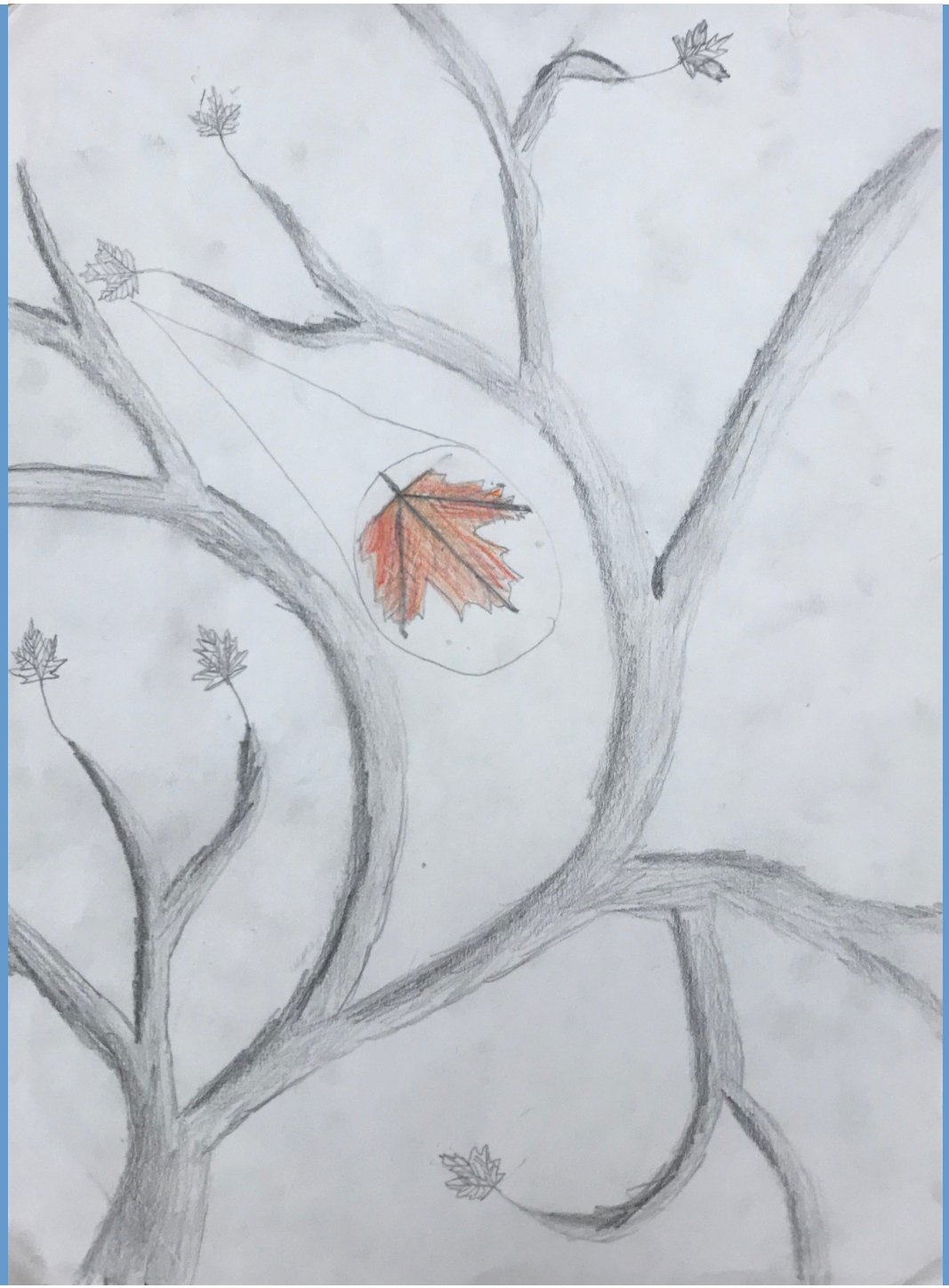
Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Even though the red tailed hawk's population is stable, climate change is affecting its migratory habits. As it gets colder and the birds start to fly south, the red tailed hawk parents say goodbye to their younglings and watch them fly south. The red tailed hawk doesn't go anywhere; it stays and guard its territory. As it warms up they gather sticks, grass and leaves and builds its nest for mating in the summer. As that time gets closer about six eggs start to appear, then the leaves start to fall, and the younglings fly south.

Art and paragraph by
Frankie Weaver

August 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31



Climate change has made the growing season drier and warmer. This has had a negative effect on sugar maple trees. The growing pattern of the trees has changed. Climate change is stunting tree growth by making the weather drier and warmer during the growing season. If climate change is not stopped, the trees may go extinct. This is because younger trees are having a harder time surviving in this warmer, drier weather that climate change is bringing. Climate change has had a negative effect on sugar maple trees.

Art and paragraph by
Isaac Stender

September 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Due to climate change and global warming, the spring season in the upper Midwest of the United States have become warmer and wetter. This has had an effect on many Minnesota species, but it has a profound effect on morel mushrooms. Morel mushrooms are a delicious type of fungi that are widely sought after, and whose season historically started in early May or June. Now with the temperatures rising the morel season is starting in mid to late April where the temperatures are ideal. While this might seem like a small difference, we are seeing hundreds more morel mushrooms growing due to the longer season. As of right now climate change is having a positive effect on this particular fungi but that could change. The current combination of a wetter and warmer climate is perfect for morels, but fast-forward a few decades with our current global warming trends and the conditions may no longer be favorable for morel mushrooms.

Art and paragraph by
Lily Weissman

October 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Minnesota climate is changing and it will affect many animals, including the great horned owl, also known to scientists as *Bubo virginianus*. Great horned owls are most likely found in the deciduous and coniferous forests. Climate change will affect the great horned owl because the owls incubate their eggs early so their owlings can hatch nicely and warmly so sudden spring cold snaps will affect the owls and their eggs that are trying to hatch. Minnesota is also getting super warm because last year April of 2017 the temperature can be in a range of 36°F to 67 °F but this year of April 2018 the temperature range were 31°F to 71°F so it may confuse the owl on when they should incubate their eggs. Overall climate change can and will affect the great horned owl.

Art and paragraph by
Orathai Hang

November 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

The climate change would effect the amount of food the snowy owls have. If there is little to no food for them they would move south for winter. According to the Audubon Society, “It’s all about food availability: when the birds rodent prey base crashes, snowy owls push south in the winter.” However, with climate change, the rodent base doesn't crash. So the snowy owl doesn't have to move as far south. To summarize all of this, it is about how climate change affects the food that is available to the snowy owl and how the move south in winter if there is little to no food available for them.

Art and paragraph by
Mi Paw

December 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

About the 2018 Phenology Calendar

This year's phenology calendar was edited and produced by the intrepid 2017-2018 7th grade Life Science students at Open World Learning Community (OWL). Each student researched and illustrated one Minnesota species. In the process, the class discovered the phenology, or seasonal events, important to their species, as well as relevant global climate change impacts.

This calendar was made possible by a generous grant from the Open World Learning PTO.

The layout team

Editors in Chief

Veronica Rohde and Debora Tesfamariam

Additional Editing and Writing work

Cy Christensen and Emilia Hulson

Thank you to Ellison Northrop-Kiel, Otis King , Lucy Annis-Bercier, Samantha O'Hara Graff, Jude Witt, Anders Mork, Owen Vaughan - Fier, Frankie Weaver, Isaac Stender, Lily Weissman, Orathai Hang, Mi Paw for their writing and artwork.

Special thanks to Megan Hall and Brie – Anna Medin for inspiration & supervision.