"If the Birds Stop Singing"

You might know the expression canary in a coal mine, a saying used to denote something that serves as an early warning of danger. Like most English idioms, it's nearly nonsensical without an understanding of its origin story.

Beginning in 1911, and lasting through much of the 20th Century, miners brought caged, domestic canaries along with them into coal mines as a safety mechanism. Birds are what's referred to as a sentinel species, they detect risks to humans and provide warning signs for environmental changes like the introduction of poisons into the air. Canaries for instance, were brought into coal mines to detect carbon monoxide.

The small yellow birds sung throughout the day, their whistling echoing through the tunnels. Maybe their songs boosted morale during long working hours, or maybe they just blended into the scene, an everyday sonic experience that came along with the job. But, if the canaries were to stop singing, if they were to fall off their perches from fainting...or fatality, then the workers would know that the air in the mine was no longer safe for them to breathe in, which meant that it was time for them to leave.

Birds need a lot of oxygen to fly and to fly as high as they do, far above altitudes that human populations could easily handle. They have an extremely efficient respiratory system that allows for a continuous one way-flow of air. Meaning that birds are constantly taking in oxygen, even when they're exhaling. If there was poison in the air, the caged canaries would be able to detect it before the human workers were affected because the birds would be breathing more of it in. Canaries were integral to mining practices. Overtime, they developed special cages for them that included little airtight doors which helped to revive them if they fainted from an intake of carbon monoxide. Some miners even carried small vials of oxygen to help the birds recover if they were poisoned.

It's often said that what's good for birds is good for humans, and because of that, birds have always been a barometer for changes in our shared environment...and the health of that environment. So when a study came out in 2019 showing a decrease of an estimated 3 billion birds from North American skies since 1970, it was a sort of canary in a coal mine for a lot of people.

In the North West of the island of Montreal, in the borough of Saint-Laurent, just North of the Pierre Elliott Trudeau International Airport and just East of Golf Dorval, there's a business centre named Technoparc Montréal where 114 companies run their operations. From aerospace engineering, to companies that develop Kids GPS tracking devices, from corporate cafeteria caterers to data centers, these businesses have been built up around one of Montreal's last, significantly intact wetlands. What was once forest and swamp, teeming with biodiversity, has gradually dwindled as Technoparc Montréal has expanded over the last thirty some years...but in the southern sector, there's an area yet untouched by development.

Here you'll find wetlands, open fields, forests, and other varied environments which contribute to healthy and safe feeding and breeding sites for local and migratory bird populations. In 2020, bird watchers that visited this area were able to spot 190 of the 250 species of birds that can be found in Montreal. Unfortunately though, the area's not protected and it's constantly compromised by the threat of further development. In 2017, developers paid by the city put in a road and dike that reduced the

largest wetland by half. When that happened, several marshes dried up and sightings of a number of birds like egrets decreased drastically.

At the beginning of 2021, a coalition of Montreal environmental groups put forward a proposal to preserve the wetlands as well as the land north of the airport, in hopes of turning it into a 140 hectare national wildlife refuge. Unfortunately, on March 1st of the same year, the Quebec Superior Court ruled against the coalition's efforts to prevent further development.

The forests, meadows and marshes the groups were advocating for are a mixture of federal crown land, land owned by the city, and land owned by private developers. Biodiversity is declining faster than ever in human history but when there's profit to be made for these stakeholders, that profit often outweighs the value of land preservation, and by extension, also outweighs the risk posed by the destruction of these environments. This isn't just a story about the wetlands in Saint-Laurent, this is happening all around Montreal.

Before Montreal's Nuns' Island was developed, you would be able to see half a dozen varieties of owls there. But now that forests have been uprooted to make way for condos, you won't see many owls at all...if any. In Pointe-Claire, residents are currently mobilizing to protect Fairview forest from a massive development project that aims to build a "downtown" satellite city in the West Island. Then there's Hudson's Sandy Beach on the banks of the Outaouais river where they're proposing construction of 200 housing units. The area is a potential historic site where artifacts dating back to 4,000 years from indigenous trade routes have been found, and it's also home to more wetlands that the development would threaten. When the desire for profit creates a rush to build, archaeological and environmental assessments can get streamlined, causing irreparable damage. And habitat loss is the first and foremost reason for falling populations of many species...including birds.

We know much of what we know about fluctuating bird populations from the people who watch birds. Bird watchers take their hobby quite seriously, recording and submitting what they see in the skies and the trees to databases and researchers and assembling annually for national and international events, the Christmas Bird Count being one of the most popular ones. The event was first introduced in 1900, as a conservation effort proposed by ornithologist Frank M. Chapman to steer people away from Christmas day bird hunts, and toward a Christmas day bird census instead. The count happens every year, rain or shine, and has been going on in Quebec since 1935. During Montreal's 2020 Christmas Bird Count, they found 16,107 birds, a jump from 2019's 11,877. They even spotted a new record of 77 species.

The data collected at these events help move scientific research forward, making birding a type of citizen science, which is the term for when amateurs provide data to professionals to use in their research. Their recordings inform a lot of what we know about the behaviour of bird populations, which tell us a lot of what we know about the climate...and how it's changing.

Earth's climate is changing 20 times faster than it has during any period of the past two million years. Changes that used to happen in thousands of years, are now happening in decades. Shifts in temperatures mean birds arrive earlier in the spring, sometimes before their food does. If the insects and plants that make up their diet aren't out for the season yet, then birds aren't able to properly nourish themselves after their long migratory journeys. An increase in extreme weather patterns are doing damage in their own right. Wildfires and droughts lead to a loss of habitat. Storms and hurricanes

kill migratory birds en route and sometimes wipe out whole colonies of shore birds. Egg laying is happening earlier too. The common Murre, a North American bird that breeds on the gulf of the Saint-Lawrence, has advanced its breeding date...by 24 days per decade. Because the climate is in expedited change and birds take seasonal cues, their behaviours are becoming more and more out of sync with their environments.

Birds are even adapting physically to the climate crisis. As a result of rising temperatures, birds' bodies are shrinking. A smaller body means the bird will have less energy for a long journey, but their wingspans are lengthening in order to compensate for the change. There's some theories as to why. One is that with smaller bodies, they'll lose body heat faster in a warming climate, allowing them to cool off quicker. These adaptations are striking, but they're not happening quickly enough to handle the rapid changes in our environments. It's important that we pay attention to these changes, because birds are a much bigger part of our environment than we sometimes remember to give them credit for.

Birds provide ecosystem services. They're one of many species that support and improve ecosystems and by extension the conditions for human life. They perform regulating services, like hummingbirds who are important pollinators in Quebec and many other places. Vultures, buzzards, and condors are scavengers, consuming the carcasses of dead animals, cleaning up environments by removing the dead and in doing so helping limit the spread of disease. Birds also reduce and control the impacts of pest species like bugs. The Spruce budworm for example, is the caterpillar of a particularly destructive moth that feeds on fir and spruce trees. By including these caterpillars in their diets, birds help control their numbers, which limits the damage they cause to trees and forests. There's also birds of prey like hawks and owls, who eat rodents that feed extensively on crops, destroying agriculture and affecting human food systems. The average barn owl eats around 11,000 mice in its lifetime, mice that would otherwise eat 13 tons of crops. Then there's seed dispersal. Birds don't have teeth so when they feed on ripe seeds or berries they tend to swallow them whole. When they defecate these seeds are passed, often still intact and further germinated by the nutrients in their feces. In fact, 92% of seeds from woody tree species are dispersed by birds. In this are 85 timber species, 182 edible plants, 153 medicinal plants, 146 ornamental species and 84 others with economic and cultural significance.

So, birds do a lot. And that's not even all that they do. They help with nutrient cycling and soil formation, they provide mobile links between environments, and they engineer ecosystems with their nests, tree holes and burrows, which, once abandoned, are left to be occupied by other organisms. And there's more, there's always more...But, we'll stop there, because that's a lot already.

There are 604 North American bird species, 389 of them are at risk of extinction because of climate change. Those chances can be improved, but change has to be made now. The good news is that what we need to do to care for bird populations are actually a lot of the same things we need to do to mitigate the climate crisis.

In combination with efforts to reduce greenhouse gas emissions, incorporating nature-based solutions is one way we can start to repair. This means protecting, restoring and maintaining natural environments. Efforts like reforestation, preventing further deforestation and preserving complex habitats, can simultaneously capture and sequester carbon from the atmosphere and benefit biodiversity. And why wouldn't we preserve these mature forests, wetlands and shorelines when we know how important they are? Especially when, as a measure to fight against climate change, Montreal spent $6.8 million on planting trees between 2012 and 2019...

Birds contribute a lot to our planet and its ecosystems, which is why their decline raises such cause for concern. The needs of birds are often a reflection of our own. So ensuring their needs are cared for means the needs of humans are as well. It's not the health of one canary in a coal mine we're talking about here, it's the health of the whole interdependent web of the natural world and all the living things that occupy it.