Eli Harmon, Leah Wimmer, Melissa Wysocki

ENSC 499R

Group Paper - Final

20 November 2020

Examining the Effects of COVID-19 on Greenhouse Gas Emissions and Human-Wildlife Interactions

I. Introduction

To date, COVID-19 has killed 237,037 people in the United States alone (CDC, 2020). COVID-19 is a zoonotic disease that originated in bats and was transmitted to humans (COVID-19, 2020). It is a highly contagious virus that led to worldwide shutdowns to isolate cases and slow the transmission of the virus. These shutdowns changed society and led to reduced travel, reduced energy consumption, and lower industrial outputs. Due to the impacts of COVID-19, the environment has responded in a variety of ways. Of these responses, changes in greenhouse gas emissions and human-wildlife interactions have been prominent. Both have been greatly affected by government mandates that have been enacted to mitigate the virus. These effects will be discussed throughout this paper.

Greenhouse gases fuel climate change. Greenhouse gases, Carbon Dioxide (CO_2), Methane (CH_4), and other fluorinated gases, are gases that trap heat within the troposphere. As emission levels increase, the effects of climate change also increase. The effects of climate change can include changes in precipitation events, longer and

more extreme droughts and heatwaves, increased temperatures, and ice cap melting (NASA, 2020). As temperatures increase, species habitats are forced to shift. Species with limited physiological tolerances, such as those in alpine and arctic habitats are especially vulnerable to climate change (Beever & Belant, 2011). There are many sources of greenhouse gases including industry, agriculture, transportation, and electricity (EPA, 2020). Since COVID-19's travel restrictions and stay-at-home mandates were implemented, CO_2 emissions from the transportation sector have decreased (Kirk, 2020). COVID-19 has likely had other effects on greenhouse gas emissions due to increased plastic production and use ("Plastic waste and climate change..", n.d.).

The COVID-19 pandemic influences conservation in many ways as well. Conservation is the preservation, protection, or restoration of the natural environment and of wildlife. In this paper, conservation is defined as the human-wildlife interactions seen during COVID-19. COVID-19 has influenced conservation in both positive and negative ways. As the pandemic continues, urban settings have seen changes in both behavior and ranges of animals, and conservationists have found that the effects of COVID-19 have caused changes to their work.

The goal of this paper is to understand how COVID-19 has impacted both greenhouse gas emissions and conservation. We will identify how both have been impacted in positive and negative ways by the pandemic. We will also discuss strategies used to ease the impacts caused by COVID-19, and how the pandemic will likely have long-term effects on government policies in place related to emissions and conservation.

II. Before COVID-19

i. Greenhouse Gas Emissions

Without greenhouse gasses and their impact on the Earth, the average temperature would be below 0°C (Lindsey, 2020). However, we are currently seeing unprecedented growth in atmospheric CO_2 levels which will have deleterious effects on our environment. The Paris Agreement, a charter signed by 195 countries aims to mitigate the impacts of climate change to stop the globe from increasing by 2°C (Dencheck, 2018). The current major objectives of the Paris Agreement aim to alleviate the impacts of climate change by reducing the current carbon emissions of the largest carbon producing countries (China, India, United States of America) by upwards of 25% (Dencheck, 2018). In 2019 atmospheric CO_2 reached an average of 409.8 ppm, which can be seen in Figure 1 below (Lindsey, 2020). This level is higher than any other level from the past 800,000 years of record, and an increase of 2.5 ppm from 2018 (Lindsey, 2020). Prior to 2018, the average growth rate was 2.3 ppm per year since 2009 (Lindsey, 2020). This growth in atmospheric CO_2 is determental as CO_2 traps heat which increases global temperatures, and is in direct conflict with the goals set out by the Paris Agreement. There is a growing concern about the feasibility of

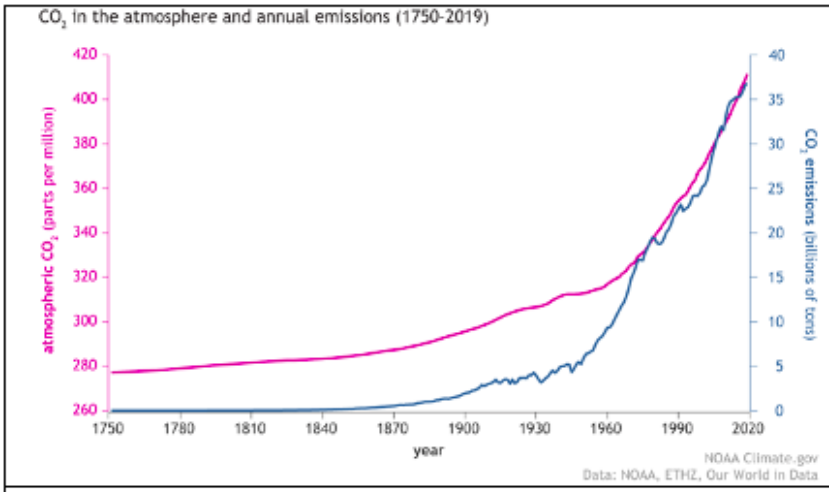

***Figure 1**: Atmospheric CO2 and CO2 emissions 1750-2020.*

(Lindsey, 2020)

the goals set out by the Paris Agreement as the United States of America, a significant contributor of greenhouse gases pulled out of the agreement in November 2020 (United Nations, 2019).

The drive to decrease CO_2 emission levels is an arduous but necessary task. Climate change can lead to increased precipitation events and flooding, longer and more extreme droughts and heatwaves, and ice caps melting which would lead to rising sea levels of which will also be more acidic (*Historic Fires Devastate the U.S. Pacific Coast,* 2020). In the United States, California is battling the responses of drought and heatwaves on an annual basis. Each year copious amounts of CO_2 is released into the atmosphere through wildfires (Figure 2), feeding back into a loop where these added CO_2 emissions increase the likelihood of these CO_2 producing events happening in the future (Harris, 2020). This is why it is paramount for humans to continue mitigating these impacts of climate change through any effort possible using any tool in the toolbox from policy change to increased conservation efforts.

Figure 2: *Carbon emissions due to wildfires in California from 1997-2020. (Historic Fires Devastate the U.S. Pacific Coast, 2020)*

ii. Conservation Efforts

Wildlife conservation laws have a short history in the United States. The first federal law passed in 1900 was the Lacey Act (16 U.S.C §§3371 - 3378) that protected game animals (NCTC, 2014). Since 1900, many more wildlife conservation laws have been passed. The Federal Migratory Bird Treaty Act (16 U.S.C. §§ 703–712) , passed in 1913, prohibits the killing, capturing, selling, trading or transporting of protected migratory bird species. The Black Bass Act (16 U.S.C. §§ 851–856), passed in 1926, outlawed the interstate transport of illegally taken black bass, and the Airborne Hunting Act (16 U.S.C. 742a - j-1), enacted in 1972, prohibits the use of aircraft to hunt or harass wildlife. Laws regarding wildlife conservation have continued to be passed. In 2018, the southern ocean finally became free from whaling along Japan's borders, a federal judge in the United States ruled that red wolves cannot be hunted, even when they are not on federal wildlife preserved land, many fashion brands such as Coach moved to ban the use of fur in their products, and Colombia vowed to protect its three million acres of the Amazon (Wunderman, 2018). Conservation laws, like these, play an important role in protecting habitat for both animals and plants. They also help to preserve heritage and culture, promote tourism, and stimulate the economy. They can also enhance food and resource security for humans.

III. During COVID-19

i. Impacts of COVID-19 on Greenhouse Gas Emissions

COVID-19 led to huge economic shutdowns all over the globe. These shutdowns have had large impacts on global greenhouse gas emission levels due to reduced travel

and stay-at-home orders. CO_2, the largest portion of greenhouse gases, contributing to 81% of our emissions in 2018 (Inventory of U.S Greenhouse Gas Emissions and Sinks, 2020), is closely monitored on a global scale by multiple agencies. Generally, CO_2 emissions are reported on an annual basis because the carbon cycle varies greatly and levels fluctuate widely. These fluctuations complicate short term emission analysis because they mask changes in anthropogenic contributions over short periods of time (Le Quere et al., 2020). This makes it difficult to identify the changes that COVID-19 has had on emissions.

With a decline in human and economic activity due to government mandated shutdowns throughout 2020, energy demand and fossil fuel use has decreased (Kirk, 2020). Energy production, often via fossil fuel combustion, is a leading contributor to greenhouse gas emissions (Kirk, 2020). A decline in fossil fuel use is expected to reduce CO_2 emissions. Currently, the International Energy Agency predicts that global CO_2 emissions will decrease by roughly 8% during the COVID-19 pandemic, to levels unseen in roughly 10 years (IEA, 2020).

A study conducted in early 2020 used a combination of energy, activity and policy data to estimate the changes in daily emissions during mandated confinement from the COVID-19 pandemic, in an attempt to mitigate the variability in CO2 emission data (Le Quere et al., 2020). The data that was collected was compared to the mean daily emissions from 2019. The results concluded that CO_2 emissions from transportation did decrease in early 2020. Other sources of evidence include analysis of Gross Domestic Product (GDP), which is correlated to CO_2 emissions (Helms, 2020). Most countries have had to scale back their economies in the face of COVID-19 (Helms,

2020). Eventually, economies will recover, and emissions will likely return to previous levels unless policies are put into place to prevent it.

The most current research suggests that emissions have decreased since the beginning of the pandemic (Le Quere et al., 2020). However, evidence to the contrary exists, such as the fact that plastic debris has increased (Zambrano-Monserrate et al., 2020). Increased plastic use and waste is evidence of increased plastic production. Plastic is one of the most persistent pollutants on Earth, and its production contributes to greenhouse gas emissions through the association of production by fossil fuels. It often takes 400 years or more to break down plastic, and it releases greenhouse gases during its decomposition (“Plastic waste and climate change..”, n.d.). Research clearly shows how plastic production and use contributes to greenhouse gases (“Plastic waste and climate change..”, n.d.). Medical waste and trash incineration have also become more popular during this pandemic. Due to the contagiousness and persistence of the COVID-19 virus, many countries are classifying all hospital waste as infectious. Infectious waste must be incinerated under high temperatures to achieve sterilization (Patrício et al., 2020).

Other emission increases have been observed due to Environmental Protection Agency (EPA) cutbacks. During the COVID-19 pandemic, the EPA cutback emission regulation enforcements in an attempt to lessen the impacts of COVID-19 on the power producing sector of its economy. In March 2020, a temporary enforcement policy was put into place which allows facilities such as coal plants, refineries, and wastewater treatment plants to be excused from mandatory reporting on emissions and pollutants. This policy was phased out by the end of August, but for much of the pandemic, it

stayed in place. While these decisions were made to help with enacting social distancing within the workplace, some believe that this is " … an open license to pollute. Plain and simple." (Utility Dive 2020). Studies have already found that about 40% fewer emission tests were submitted (Sadasivam, 2020). Approximately 16,500 facilities did not submit any reports. For those who live near the polluters, the lack of reports makes it hard to hold the polluters accountable for emissions or damage they may have caused (Sadasivam, 2020). As seen in Figure 3 below, particulate matter concentrations have increased corresponding to the EPA policy cutback (Sadasivam, 2020). This situation shows that a "global crisis will certainly defer investments in clean energy" (Medical Letter on CDC 2020).

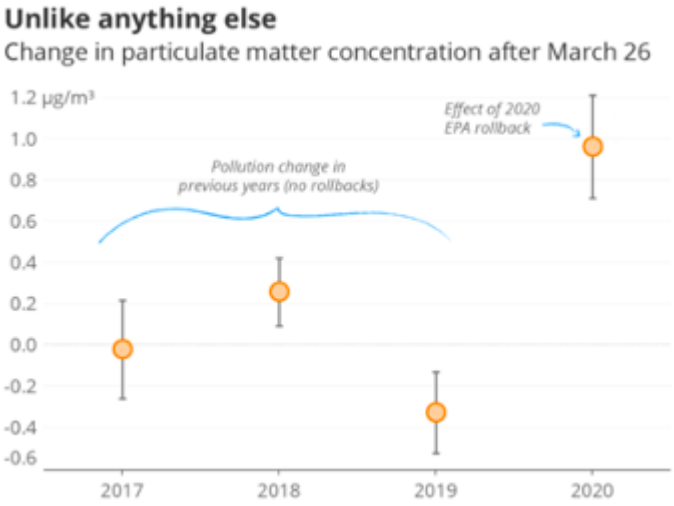

***Figure 3**: Graph showing particulate matter concentrations before and after the EPA policy rollback and after the rollback (Sadasivam, 2020).*

Overall, it is difficult to determine the influence of COVID-19 on greenhouse gas emissions. On the one hand, mandatory stay-at-home orders decreased pollution from transportation and shifted energy use and consumption. On the other hand, COVID-19

mandates have led to increased use of single-use items and plastics, increased waste production, increased trash incineration, and decreased EPA regulations. Further research is needed to determine if the emission levels have increased, decreased, or remained constant with the effects of COVID-19.

ii. Impacts of COVID-19 on Conservation

As COVID-19 has raged on, ecology in urban settings have been changing. Noise and traffic have decreased as people are socially distancing and staying at home more often. This decrease in noise and traffic has caused sightings of animals, such as deer, raccoons, and bears to become more common in urban neighborhoods (Zellmer et al. 2020). Dolphins and swans (Wray, 2020) were reported returning to the canals in Venice in March and sea turtles hatched at higher rates in India (Reuters, 2020). A question that arises from these sightings is whether they are due to human isolation or if it is because people have the time to pay attention now (Zellmer et al. 2020). There was previous knowledge that these human impacts influence the way wildlife interacts in an urban setting, but with COVID-19, scientists have been able to isolate human presence as a variable (Zellmer et al. 2020). This has allowed scientists to tease out a more accurate assessment as to which variable, humans or the setting, wildlife responds to more.

Urban conservation involves human interactions that cannot be eliminated. Species includes bird and bat species foraging habits. Many birds forage around large sporting events, such as baseball and football. A number of these events have been canceled or attendance has been restricted due to the pandemic. These species rely on waste from these events and have been adapting by shifting behaviors or shifting their

range. Another example of how COVID-19 has influenced conservation is the decrease in trade and travel. This decrease helps to limit the mobility of invasive species. Invasive species cause environmental and economic harm to the area they are introduced to and with the reduction in their mobility due to COVID-19, areas prone to invasive species are experiencing less invasions. However, there are still invasive species moving. For example, the Asian giant hornet, or the murder hornet, has still been spreading during the pandemic (Baker, 2020). With the pandemic causing stay-at-home orders and social distancing, entomologists that have been working to eradicate the species before they fully establish in the United States have not been able to be in the field. The relationship between timing of eradicating an invasive species hints at a possible approach to changes in current conservation practices.

IV. After COVID-19

i. Greenhouse Gas Emission Policies Post-COVID-19

Whether emissions have decreased or increased during the COVID-19 pandemic, society is not functioning as it had pre-pandemic. COVID-19 has induced the worst economic downturn since the Second World War (Hepburn et al., 2020). There are multiple scenarios that could follow the societal and economic recovery from COVID-19, and it is probable that governments will have to design large-scale recovery plans to overcome this crisis. These recovery plans could be ‘green’ with the potential to reduce long-run greenhouse gas emissions, ‘brown’ and likely to increase net greenhouse gas emissions beyond the base case, or ‘colorless’, meaning that they maintain the status quo (Hepburn et al., 2020). Figure __ below represents these

policies. The pink represents no climate policies or brown policies, orange representing colorless policies, and yellow, purple, and blue representing different green policies (Ritchie & Roser, 2017).

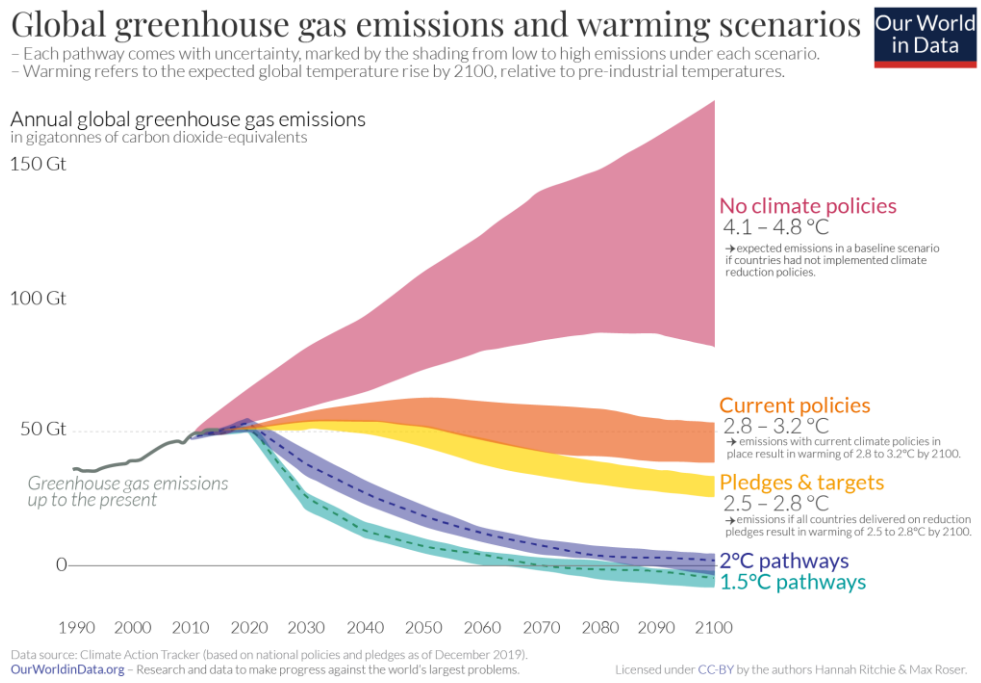

Figure 4*: This graph from 2017 represents the effects different climate policies could have on greenhouse gas emissions (Ritchie & Roser, 2017).*

Governments could utilize COVID-19's secondary impacts which have provided tangible examples of how humans impact the environment to set the stage for a 'green recovery'. This form of recovery would be effective in decoupling emissions from economic activity, would improve climate change policy, and deter greenhouse gas emission levels from increasing. An analysis by Lahcen et.al (2020) quantitatively assessed how government investments in eco-friendly construction projects could be used simultaneously to boost the economy and achieve environmental gains through reduced energy consumption and related greenhouse gas emissions (Lahcen et al.,

2020). In the U.S., only four percent of existing rescue plans are considered green (Hepburn et al., 2020).

A ‘brown recovery’ is one that reinforces the links between economic growth and fossil fuels. Initially following the lockdowns associated with COVID-19, governments funneled large amounts of money into high-polluting mainstays of the pre-pandemic economy to soften the economic downturn due to the pandemic. According to Hepburn et. al. (2020), four percent of US recovery plans are considered ‘brown’ (Hepburn et al., 2020).

In the United States, recovery plan consequences are hinged on the election and administration policies. With the COVID-19 pandemic and elections ongoing, it is unclear how they will shape future economies and societies. Time will tell how COVID-19 will promote reformations in climate change policy.

ii. Conservation Efforts and Policies Post COVID-19

Conservationists around the world have already begun to reevaluate their approach to conservation. Conservation practices are vulnerable to a global crisis, such as the COVID-19 pandemic. In order to truly assess the vulnerability of conservation, long-term research needs to continue after the pandemic has subsided (Butler, 2020a). This will allow scientists to assess data between the periods before, during, and after the pandemic. Another tool conservationists have identified that would aid in their studies, would be the use of multi-city assessments. The use of this type of assessment provides a broad range of data for observational studies (Corlett, 2020). Conservationists have also learned that remote monitoring would make these

assessments easier (Trivedy, 2020). Although these monitoring devices are costly, they would allow studies to continue during another crisis.

Another problem is that low-income communities have already lost biodiversity and will continue to as the pandemic persists. Low-income communities, such as coastal fishing villages, rely on rich biodiversity for their livelihoods (Butler, 2020, B). As social distancing and stay-at-home mandates continue, many of these communities face economic loss. During the pandemic many governments have been able to help their citizens by sending them money or guaranteeing them part of their paychecks. In low-income countries this is not an option, and the citizens are finding alternative ways to support themselves. Residents are exploiting the natural resources such as fish for food or trees for wood. Inhabitants of Madagascar often turn to producing charcoal in the forests or fishing on the coast (Gardner, 2020). However, these practices can have detrimental effects on human-wildlife interactions through accidental forest fires or the destruction of coral reefs.

COVID-19 has shown that there are many impacts that humans have on wildlife that were not as obvious before the pandemic. For this reason, there is room for new policies that can be written to aid in conservation. Rebounds in human induced impacts are likely to happen as the pandemic stabilizes, and conservationists need to be prepared for this. Aiding in this effort, infectious disease experts might find a use in working with conservationists, as healthy ecosystems provide less chance for new diseases to emerge. For example, China has already taken steps to end the trade of wild animals (Wunderman, 2018). This type of trade ending globally will allow a decreased emergence rate of zoonotic diseases. Furthering these types of policies

about trade and travel can help decrease the emergence of new diseases and decrease the chance of invasive species establishing in new areas. While there are some policies in the works during COVID-19, there is still a lot of room for policy to grow in the future.

V. Conclusion: Prepping for the Future

The way humans interact with their environment has direct impacts on emissions and wildlife. Anthropogenic greenhouse gas emissions accelerate global warming, and humans directly influence wildlife habitat. Humans also indirectly affect wildlife habitat by contributing to climate change which in turn shifts the location of suitable habitats. COVID-19 has provided the human population with tangible examples of these effects. The pandemic has also presented a unique opportunity to change the way humans influence emissions and wildlife.

With current data, it is unclear if COVID-19 led to decreased or increased greenhouse gas emissions. COVID-19 has greatly reduced travel, leading to decreased emissions from the transportation sector (Le Quere et al., 2020). However, it is uncertain how increased plastic production has affected emission levels from the industry sector (Zambrano-Monserrate et al., 2020). Further research will be needed to determine this.

After the pandemic, the country will likely be in a recession due to the economic downturn we are experiencing (Hepburn et al., 2020). In order to recover from a recession, economic recovery plans will need to be implemented. A preferred option for governments would be to opt for green economic recovery plans that stimulate economies and decrease anthropogenic contributions to greenhouse gas emissions.

This plan will decrease dependence on fossil fuels, and ultimately lead to decreased emission levels.

For conservation to move forward following the pandemic, scientists must realize the need to address underlying causes instead of responding with reactionary solutions (Butler, 2020a). Focus needs to be split between physical and social events. Conservation practices need to withstand a crisis to advance because many of the positive impacts on conservation are likely temporary and might not remain when the pandemic is over (Corlett et al., 2020). Rebounds in human induced impacts are likely to happen as the pandemic stabilizes, and conservationists need to be prepared for this. There is also a need for education, training, and networking within conservation. Prioritizing these can allow for well-rounded conservation scientists to emerge and a more robust global direction on how to advance the science.

The pandemic has allowed scientists and other professionals the opportunity to take a deeper and longer look at some of the current practices and policies regarding the environment. It has provided the human population with tangible examples of how humans influence their environment. Urban sightings of animals have become more frequent, species have adapted their ranges, and a decrease in trade and travel has caused changes in the movement of invasive species. We have also experienced the magnitude of societal changes that will be required to decrease anthropogenic emissions and curb climate change. The pandemic has also presented a unique opportunity to change the way humans influence emissions and wildlife. New policies could majorly change how we impact emissions and wildlife. In order to prepare for the future, it is clear that more research needs to be done to determine COVID-19's impact

on emissions. Further research is also needed to determine what policies would best influence human-wildlife interactions following the pandemic. This is a pivotal point in history and the way countries decide to recover from the pandemic will directly affect emissions and conservation.

VI. Citations

Airborne Hunting Act. 16 U.S.C. 742a - j-1

Baker, M. (2020, May 02). 'Murder Hornets' in the U.S.: The Rush to Stop the Asian Giant Hornet. Retrieved November 11, 2020, from https://www.nytimes.com/2020/05/02/us/asian-giant-hornet-washington.html

Black Bass Act. 16 U.S.C. §§ 851–856

Butler, Rhett. "Communities, Conservation, and Development in the Age of Covid: Time for Rethinking Approaches (commentary)." *Mongabay News [BLOG]* (2020): Mongabay News [BLOG], 2020-08-31. Web.

---. "COVID Underscores the Urgency of Holistic Community-based Approaches to Conservation (commentary)." *Mongabay News [BLOG]* (2020): Mongabay News [BLOG], 2020-04-22. Web.

CDC COVID Data Tracker. (2020). Retrieved November 09, 2020, from https://covid.cdc.gov/covid-data-tracker/

Corlett, Richard T, Primack, Richard B, Devictor, Vincent, Maas, Bea, Goswami, Varun R, Bates, Amanda E, Koh, Lian Pin, Regan, Tracey J, Loyola, Rafael, Pakeman, Robin J, Cumming, Graeme S, Pidgeon, Anna, Johns, David, and Roth, Robin. "Impacts of the Coronavirus Pandemic on Biodiversity Conservation." *Biological Conservation* 246 (2020): 108571. Web.

COVID-19 (2020). (2020).[Video/DVD] ProQuest. Retrieved from https://video-alexanderstreet-com.proxybz.lib.montana.edu/watch/covid-19

Dencheck, Melissa. “Paris Climate Agreement: Everything You Need to Know.” *NRDC*,

29 Apr. 2020,www.nrdc.org/stories/paris-climate-agreement-everything-you-need-know.

Beever, E., & Belant, J. (2012). *Ecological Consequences of Climate Change, Mechanisms, Conservation, and Management*.

Gardner, C. (2020, April 20). Nature's comeback? No, the coronavirus pandemic threatens theworld's wildlife. Retrieved November 16, 2020, from https://theconversation.com/natures-comeback-no-the-coronavirus-pandemic-threatens-the-worlds-wildlife-136209

Harris, Nancy, et al. “6 Graphics Explain the Climate Feedback Loop Fueling US Fires.” World Resources Institute 16 Sept. 2020, www.wri.org/blog/2020/us-fires-climate-emissions.

Helms, D. The Environmental Impacts of the Coronavirus. *Environ Resource Econ* **76,**21–38 (2020). https://doi-org.proxybz.lib.montana.edu/10.1007/s10640-020-00426-z

Hepburn, C., O’Callaghan, B., Stern, N., Stiglitz, J., & Zenghelis, D. (2020). Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?. Oxford Review of Economic Policy, 36.

“Historic Fires Devastate the U.S. Pacific Coast.” *NASA*, NASA, 9 Sept. 2020, earthobservatory.nasa.gov/images/147277/historic-fires-devastate-the-us-pacific-coast.

IEA (2020), *Global Energy Review 2020*, IEA, Paris

"Inventory of U.S. Greenhouse Gas Emissions and Sinks." *EPA*, Environmental Protection Agency, 11 Sept. 2020, www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks.

Lacey Act. 16 U.S.C 3371 - 3378

Lahcen, B, Brusselaers, J, Vrancken, K, Dams, Y, Da Silva Paes, C, Eyckmans, J, & Rousseau, S. (2020). Green Recovery Policies for the COVID-19 Crisis: Modelling the Impact on the Economy and Greenhouse Gas Emissions. Environmental & Resource Economics, 76(4), 731-750.

Lankford, Ronald D. (2009). Greenhouse gases (At issue. Greenhouse gases).

Le Quere, Corinne, Jackson, Robert B, Jones, Matthew W, Smith, Adam J. P, Abernethy, Sam, Anew, Robbie M, . . . Peters, Glen P. (2020). Temporary reduction in daily global CO2 emissions during the COVID-19 forced confinement. *Nature Climate Change, 10*(7), 647-653.

Lindsey, Rebecca. "Climate Change: Atmospheric Carbon Dioxide: NOAA Climate.gov." *Climate Change: Atmospheric Carbon Dioxide | NOAA Climate.gov*, Climate.gov, 14 Aug. 2020, www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide.

Migratory Bird Treaty Act. 16 U.S.C. §§ 703–712

NCTC. (2014, February 21). Origins of Federal Wildlife Laws and Enforcement. Retrieved November 16, 2020, from https://training.fws.gov/History/TimelinesLawEnforcement.html

Reuters. (2020, May 11). Millions of baby turtles hatch on empty beaches. Retrieved November 16, 2020, from https://www.rte.ie/news/newslens/2020/0511/1137627-sea-turtles/

Ritchie, H., & Roser, M. (2017, May 11). CO_2 and Greenhouse Gas Emissions. Retrieved

November 18, 2020, from https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions

Sadasivam, Naveena. “The EPA Cut Back Enforcement during COVID. These Researchers Are Assessing the Damage.” *Grist*, Grist Magazine Inc., 17 Sept. 2020, grist.org/justice/the-epa-cut-back-enforcement-during-covid-these-researchers-are-assessing-the-damage/.

“Sources of Greenhouse Gas Emissions.” *EPA*, Environmental Protection Agency, 9 Sept. 2020, www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

“The Effects of Climate Change.” *NASA*, NASA, 21 Aug. 2020,climate.nasa.gov/effects/.

Trivedy, Chet. "Is 2020 the Year When Primatologists Should Cancel Fieldwork? A Reply." *American Journal of Primatology* 82.8 (2020): E23173-N/a. Web.

U.S. Conservation Laws. (2020). Retrieved November 01, 2020, from https://www.fws.gov/international/laws-treaties-agreements/us-conservation-laws/

United Nations. (2019). UNITED STATES OF AMERICA: WITHDRAWAL. Retrieved November 2020, 2020, from https://treaties.un.org/doc/Publication/CN/2019/CN.575.2019-Eng.pdf

Utility Dive (2020) EPA gives power plants, regulated entities pollution compliance flexibility citing Covid-19 concerns, 30 March. Available from https://www.utilitydive.com/news/epa-gives-power-plants-regulated-entities-pollution-compliance-flexibility/575103/

Wray, Meaghan. “Dolphins Return to Italy's Coast amid Coronavirus Lockdown: 'Nature Just Hit the Reset Button'.” *Global News*, Global News, 23 Mar. 2020, globalnews.ca/news/6697281/dolphins-italy-coronavirus/.

Wunderman, A. (2018, December 27). The 10 biggest wildlife conservation wins of 2018.

Retrieved November 01, 2020, from https://matadornetwork.com/read/biggest-wildlife-conservation-wins-2018/

Zellmer, Amanda J, Wood, Eric M, Surasinghe, Thilina, Putman, Breanna J, Pauly, Gregory B,

Magle, Seth B, Lewis, Jesse S, Kay, Cria A. M, and Fidino, Mason. "What Can We Learn from Wildlife Sightings during the COVID-19 Global Shutdown?" *Ecosphere (Washington, D.C)* 11.8 (2020): E03215-N/a. Web.