Name:

**Assignment 2 GEOG 212**

*This assignment is worth 25 points and will be evaluated based on completeness, accuracy, and comprehensiveness, using the criteria, instructions, and the allocated points listed for each task in this document. Resources that may help you in completing this assignment include the course textbook, the modules and PowerPoints, and some on-line research (depending on the questions/tasks being asked of you).*

*Review this video on*[*How to Submit an Assignment in Blackboard*](https://bbaddins.schoolcraft.edu/addins/dl/help-videos/Assignment_Help_Video.html)*if you need assistance with this feature. See Calendar for due date. Please save your assignment as a Word document (don’t alter the format of this Word document) and type your name or initials at the end of the file name. Once completed and saved to a certain folder on your computer, go into the Assignment folder on Blackboard and upload your assignment accordingly.*

**Part 2.1 – Ecosystems and Nutrient Recycling**

1. For an American red squirrel, list at least three biotic and abiotic things that might be important for its survival (fill out the table below): ***[3 points]***

|  |  |
| --- | --- |
| **Biotic** | **Abiotic** |
| Food (nuts, seeds, small fruits) | Temperature |
| Predators (hawks, foxes, and larger mammals) | Water availability |
| Competitors (other squirrels or small mammals) | Habitat |

1. List at least three natural (non-human) sources/mechanics each for carbon sources and sinks:  
   ***[3 points]***

|  |  |
| --- | --- |
| **Carbon Source (things that release carbon into the atmosphere)** | **Carbon Sinks  (things that absorb carbon from the atmosphere)** |
| Volcanic Eruptions | Oceans |
| Wildfires | Forests |
| Respiration from aerobic organisms | Soil |

1. How does anthropogenic (human caused) activity alter the carbon cycle? Explain your answer and describe how the carbon cycle is altered by this. ***[4 points]***

|  |
| --- |
| Anthropogenic activity alters the carbon cycle in many ways. The main culprits are fossil fuel consumption, deforestation, industrial, agriculture, and cement production. These alter the carbon cycle by increasing CO2 emissions, for instance increased CO2 levels thicken Earth’s thermal blanket (aka the greenhouse effect) which drives up temperatures. This creates a feedback loop in which polar ice melts which reduces the reflection of sunlight. Since the ocean is absorbing more heat, the ice caps will continue to melt. |

**Part 2.2 – Population Ecology**

1. List the problems of the two extremes of population size of organisms; i.e. when the population size is below minimum, and when it is above the carrying capacity. ***[5 points]***

|  |  |
| --- | --- |
| **Below Minimum** | **Above Carrying Capacity** |
| Genetic Drift | Resource Depletion |
| Inbreeding | Disease Spread |
| Allee Effect (harder time finding mates) | Competitive Exclusion |
| Functional Extinction | Environmental Degradation |
| Increased Vulnerability | Social Stress |

1. The polar bear has always been a symbol of climate change and environmental issues. Today, the overall populations of polar bears in the arctic region are somewhat stable – this is due to conservation efforts implemented since the mid 1970’s. The diagram below from the shows 19 populations of polar bears and their status. The [Polar Bear Specialist Group of the IUCN Species Survival Commission](https://www.iucn-pbsg.org/#home-statistics) and the [Polar Bear Range States](https://polarbearagreement.org/polar-bear-biology/population-distribution-and-trends) showcase up-to-date information on the status of polar bear populations. Click through their websites and read about how the population, distribution, and trends have changed/are changing through time and what factors contribute to their changes. One major problem that the polar bears are facing today is a shrinking habitat due to human activities. Using the concepts presented in this module, the diagram, and the websites, explain how a shrinking habitat affects the density of the polar bear population (think about what kind of problems a shrinking habitat will cause to the Polar bear population). ***[10 points]***

Diagram

Description automatically generated

|  |
| --- |
| Even though we have implemented some conservation efforts, the polar bears habitat is constantly shrinking, and they face many problems. A shrinking habitat is devasting for a species, for example, as the ice melts away and available territory shrinks, the same number of polar bears will be confined into a much smaller space. This can cause increased competition and with increased competition comes more resource consumption. Some polar bears will be left without resources which can cause malnutrition and reduced reproduction rates. Some polar bears might decide to leave their habitat altogether and venture towards human settlements, which often end badly for the polar bears. Those who decide to stay in the condensed habitat will experience high levels of stress and higher levels of disease being spread. Polar bears are also often solitary animals that require large amounts of space, so the problems mentioned earlier will only be worse knowing this. Once the population shrinks, the genetic diversity will start to stagnant which can make them more susceptible to disease and reduce adaptability. These are only a handful of issues that the polar bears are currently experiencing, but there are still so many more issues I did not talk about in this short answer response. |