**Student Mini-Proposal #1**

**Title: Water temperature and Penguin Foraging**

**Introduction**

Our group is interested in the topic of Penguin Foraging locations and how they are affected by water temperature.  We will look at data of water temperatures and where penguins are located to complete our project.  We will get our data from the internet.  Then, will look for patterns in where penguins are and the temperature of the water.  In this way we will be able to determine if their is a link between water temperature and penguin foraging locations.

**Testable Question**

How does water temperature affect where penguins forage?

**Hypothesis**

Water temperature will be linked to where penguins forage.

**Materials:**

* Computer
* Internet
* Research Websites

**Procedure:**

**How will data be collected?:** Data will be researched and collected on the Internet.

**How often will data be collected and recorded?:** Data will be collected in school.  We are using Project Converge Data from January 2015.

**How will measurements be taken?:** We will observe  and research data used and recorded at Project Coverage's research center, Palmer Station in Antarctica.  Also, we will look at and research other data on the internet.

**What tools and methods will be used to collect data?:** We will use the data charts provided by the scientist in Antarctica. Also, we will compare the data on water temperature to maps of penguins.  Then the data will be analyzed for patterns between the penguins and water temperatures.

* **Planned Procedure – Investigation Design Table**

|  |  |
| --- | --- |
| **Independent Variable:** Water Temperature | **Background Questions:**  Where do penguins forage?  What causes water temperature changes in Antarctica? |
| **Dependent Variable:** Where penguins forage | **Constants:**Location (Antarctica) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Control Group:** | **Treatment Group 1:** | **Treatment Group 2:** | **Treatment Group 3:** | **Treatment Group 4:** |

**Planned Procedure - Description of Data Analysis**

* **What kind of data table will be used?**
* **How will the data be reviewed for outliers?** The data will be researched, and we will determine what factors determined that data to be an outlier.  Then, we will determine whether or not to include the outlier in the final data.
* **What tools will be used to interpret the data?** We will use multiple tools, such as graphs, our minds and most importantly our computers to research and interpret the given data to complete the project.
* **What type(s) of figure(s) will be used to show the data?** We will use various types of graphs to show a vast amount of our data researched and tested in Project Converge.
* **What type(s) of math or statistics will be used to interpret the data?** All kinds and any kinds that are needed.

**Student Mini-Proposal #2**

**Temperature Affecting Krill Population**

Introduction

The topic area we are interested in understanding is how the climate affects the amount of krill the Adélie penguins can feed upon. To understand how climate affects krill we will use data found by the researchers in Palmer Station. We will study the ideal temperature in which krill grow in abundance. Also we will compare the data from over the years, of the Palmer station scientists to other scientists and compare results. Comparing data will give us a range of information to figure out how climate affects krill.

Testable Question and Hypothesis

**Our testable question is:** Does the temperature change of the ocean directly affect the amount of krill the Adélie penguins can feed upon?

**Our hypothesis is:** If the temperature decreases by a whole degree then the amount of krill available to the penguins will increase.

Materials

|  |  |
| --- | --- |
| * Data Tables * Databases | * Internet * Computer |

Procedure

1. How will data be collected?- Data will be collected once every two days for four weeks total. Before data is collected we will research information on the climate of Antarctica and about krill from the Project Converge site.
2. How will measurements be taken?- Measurements are already taken by scientists.
3. What tools and methods will be use to collect the data?- Methods used to collect data will be using the Project Converge blog. The tool we will use is a computer.
4. How often will data be collected and recorded?- Data will be collected and recorded once every two school days for four weeks.
5. How long will the investigation last?- Our investigation will last for four to six weeks after the start of the first data collection.

Planned Procedure- Investigation Design Table

|  |  |
| --- | --- |
| Independent Variable:   * Temperature | Background Questions:   * If there is a climate change does it directly affect the location of penguins or are there other factors? * Does the climate and ocean temperature affect the activities of the penguins? * How does climate change make an impact on the daily lives of the penguins? |
| Dependent Variable:   * Krill populations | Constants:   * Adélie penguins * Time of year |

|  |  |  |  |
| --- | --- | --- | --- |
| Control Group  Not applicable | Treatment Group #1  Not applicable | Treatment Group #2  Not applicable | Treatment Group #3  Not applicable |

Planned Procedure - Description of Data Analysis

1. What kind of data table will be used? We will be using a line graph to show to population of krill over time  and bar graphs to compare krill populations in different areas for our data. We will use another line graph to show temperature over the past two years of every 5 months.
2. How will the data be reviewed for outliers?- Before analyzing the data, we will look through the recorded data and compare them to any of the notes that we took.  If there is  data that seems out of order then, we will look through our notes to see if something could explain the different data and if we are unable to find it we will exclude the data from our research.
3. What tools will be used to interpret the data?- We will use a computer to interpret our data.
4. What type(s) of figure(s) will be used to show the data?- Graphs will be used to show our data.
5. What type(s) of math or statistics will be used to interpret the data?- The math used will be comparing different charts of data.

**Student Mini-Proposal #3**

**Title: How Sea Ice Affects the Foraging of Adélie Penguins**

**Introduction:** The topic area that we are interested in understanding more about is how the amount of sea ice effects Adélie penguins’ foraging for krill. To understand how the amount of sea ice affects the penguins’ foraging, we will analyze past data collected over the last ten years. We will interpret the data and analyze them using line graphs and bar graphs. We will then determine how the amount of sea ice affects the difficulty or accessibility Adélie penguins have foraging for krill.

**Testable Question:** How does the increase or decrease of sea ice affect where the Adéle penguins forage?

**Hypotheses:**

1. When there is an increase of sea ice, Adélie penguins will have more quantities of krill to forage for.

2. When there is an decrease of sea ice, Adélie penguins will have less quantities of  krill to forage for.

**Materials:** “A Cooperative Classroom” packet, Internet (project converge data) and research websites

**Planned Procedure:**

* How will data be collected? - We will collect the data from the packet “A Cooperative Classroom.” From the packet, we will use the oceanographers’ sea ice data and biologists’ krill data (data source: Atkinson et al. 2004). Also, we will collect data from project converge.
* How will measurements be taken? - The measurements we are using have already been recorded.
* What tools and methods will be used to collect the data? -  We will be using data collected by the tags on the penguins and the gliders from project converge. We will also use the data from the investigation of climate change. We will access the data from our computers.
* How often will data be collected and recorded? - Over the next four to six weeks, we will analyze past data from “A Cooperative Classroom” packet from the same month of the last ten years and this current year from project converge data.
* How long will the investigation last? - The investigation will last four to six weeks.

**Planned Procedure - Investigation Design Table:**

|  |  |
| --- | --- |
| Independent Variable:  Sea Ice | Background Questions: In the winter does the amount of sea ice increase? |
| Dependent Variable: Adélie Penguins | Constants: Antarctica |

* What kind of data table will be used? - Line graphs and bar graphs will be used to record data.
* How will the data be reviewed for outliers? - The line graph will compare and contrast the amount of sea ice and krill population over a span of ten years. The bar graph will compare and contrast the amount of sea ice and krill population over a span of a few months. By creating line graphs and bar graphs, we will be able to see the outliers in our data.
* What tools will be used to interpret the data? - Computers and experiments will be used to interpret the data.
* What type(s) if figure(s) will be used to show the data? - Graphs, charts, calculators and basic math will be used to interpret the data.

**Student Mini-Proposal #4**

**Title:** The Effect of Krill Population Density on the Amount of Adélie Penguin Births

**Introduction**

The topic area we are interested in is the number of Adélie penguin births relative to krill density. The Adélie penguins depend on krill as their food source. The density of krill has fluctuated over the years along with the number of Adélie penguin births. We suspect that the amount of krill in Antarctica can greatly affect the number of penguin births. We will research data sets online to find information about this topic. The data found will then be analyzed and any trends will be documented.

**Testable Question and Hypothesis**

Testable Question: Does a more dense krill population in Antarctica allow for a larger amount of Adélie penguin births?

Hypothesis:

1. If there is a more dense krill population in Antarctica, then there will be more Adélie penguin births.
2. If there is a less dense krill population in Antarctica, then there will be less Adélie penguin births.

**Materials**

* Computer
* Access to internet

**Planned Procedure - Description of Data Collection**

* How will data be collected? Data will be collected daily. We will search for Adélie penguin birth rates and the density of krill. After finding studies online, we compile the data. We will create an ongoing document of this information, so it can be analyzed later.
* How will measurements be taken? We are using data that has been previously collected by other scientists, so no measurements need to be taken.
* What tools and methods will be used to collect the data? Computers with internet access will be used to collect and compile data.
* How often will data be collected and recorded? The data used is yearly data.
* How long will the investigation last? The investigation will last four to six weeks.

**Planned Procedure – Investigation Design Table**

|  |  |
| --- | --- |
| **Independent Variable:** Krill Population Density | **Background Questions:**  How does a species food source affect their rate of reproduction?  Do species have more offspring with more or less food? |
| **Dependent Variable:** Penguin Births | **Constants:** Type of Krill and Adélie Penguin |

**Planned Procedure – Description of Data Analysis**

* What kind of data table will be used? We will use two different two-column data table when compiling research. One table will record krill density and one will record penguin births. The first column will have the year and the other will have the density of krill or number of penguin births. These two tables will be compared during analysis.
* How will the data be reviewed for outliers? Upon comparing these two tables, we may encounter some outliers. If a set of numbers for a specific year does not follow the general trend, then it will be further analyzed.
* What tools will be used to interpret the data? The only tool needed to interpret the data is a computer to create graphs and tables.
* What type(s) of figure(s) will be used to show the data? The number of penguin births compared to the krill population density will be compared in bar and line graphs.
* What type(s) of math or statistics will be used to interpret the data? We will compare krill population density data to data stating the number of penguin births. We will then determine if there is a correlation between krill and penguin births.

**Student Mini-Proposal #5**

Title- Antarctic Tide Cycle’s Effect on Adelie Penguin feeding

Summary: For this project I will be researching how tides affect the Adelie penguin feeding. They feed on krill so I’m using the krill biomass charts for where the penguin go to eat and if they go when there is more krill or less and if they go at high or low tide. Which do they swim better in, high or low and what tide are krill out the most. Does this all effect penguin’s feeding is my main question.

Procedures and items used- Display board, krill biomass data to analyze for, January 5 th, January 6 th, January 9 th, January 12 th, January 21 st, and January 25 th. Tide cycle charts for these same dates. Penguin track data charts on those dates to analyze as well. Powerpoint to show moving Adelie track data.