

**“The effect of time of the day on the tufted puffin habitat usage.”**

This project was evaluated using the point scale of 0-1-2-3. The project was evaluated based on the visible information in the project photograph; some more information may have been on the additional sheets.

**A. Title**

**Title:** The effect of time of the day on tufted puffin habitat usage.

**Score: 3** – *The title correctly states the independent variable and the dependent variable and is NOT worded as a QUESTION.*

**Comments:** This title states both the independent variable (time of day) and the dependent variable (habitat usage).

**B. Question**

**Question:** How does the time of the day affect habitat usage in tufted puffins?

**Score: 3** – *The question states the independent variable and the dependent variable, and is testable.*

**Comments:** This question correctly states the independent and dependent variable. In addition, the dependent variable is measurable.

**C. Hypothesis**

**Hypothesis:** Tufted Puffins will spend an increased amount of time on land compared to the water because “From approximately September to March each year they swim catching fish wherever they go. They are rarely within sight of land for the entire winter” (Maclead, 1990).

**Score: 2** – *The hypothesis (1) predicts the effect that changing the independent variable will have on the dependent variable AND (2) explains the reasoning for the prediction using scientific concepts (“because...”) but is incomplete or weak.*

**Comments:** The hypothesis frames that there is a relationship between the independent variable (time of day) and the dependent variable (habitat usage) using background research to say that the land habitat usage is more than the water. Since the citation refers to September-March being the time of year when tufted puffins spend most time in the water, the hypothesis should include the time of year of when this investigation was completed in reference to the seasonal behavioral changes (i.e., breeding season). It is recommended that the student reword their hypothesis to say “If we observe the tufted puffins in (the month they are being observed)...then the Tufted Puffins will spend an increased amount of time on land compared to water because...” and use the same scientific reasoning. One additional source that can be used is:

[http://alaska.usgs.gov/science/biology/seabirds\\_foragefish/products/publications/Piatt\\_2002\\_Tufted\\_Puffin\\_Birds\\_of\\_N\\_America.pdf](http://alaska.usgs.gov/science/biology/seabirds_foragefish/products/publications/Piatt_2002_Tufted_Puffin_Birds_of_N_America.pdf)

**D. Background Research (found throughout the project especially within the hypothesis and discussion/conclusion sections)**

**Score: 2** – *Background research is accurate, containing SOME relevant, well-chosen facts, definitions, concrete details, quotations, scientific concepts, or other information and examples that (1) provide information on the IV & DV AND (2) attempts to support the “because” portion of the hypothesis OR (3) attempts to support the “scientific reasoning” of the discussion/conclusion.*

**Comments:** The background information section includes one fact each about the distribution, nesting habitat and seasonal movement between land and water. However, while the research facts were accurately chosen to support the discussion/conclusion, it is suggested that they be presented with a cohesive connection to the relationship between the independent and dependent variables in the investigation question rather than as isolated facts. It is recommended that the student use sentence starters such as “research indicates that tufted puffins spend more time on land because...” or “the author of ....states that...”

## **E. Investigation Design (ID)**

**Score: 2** – *Four of the 5 components of the ID are stated correctly, OR more than one IV is changing at a time or there are not multiple trials.*

**Comments:** The ID correctly states the independent variable (time of day), dependent variable (habitat usage), levels of IV (morning & afternoon) & number of trials (3 for each level of IV). In the future, the student should be sure to state all constant variables on the ID (testers, animal, and nest).

## **F. Procedure**

**Score: 2** – *The Procedure accurately and completely satisfies two or three of the above. (The procedure is (1) a step-by-step description of how the investigation was done AND (2) uses precise language and scientific vocabulary to describe both the sequence of actions taken and materials used AND (3) is sufficiently detailed to enable the reader to replicate the investigation AND (4) is consistent with the Investigation Design Diagram (IDD) and is an appropriate test of the hypothesis.)*

**Comments:** While the ethogram was posted and roles were assigned to group members, the procedure needs additional specific steps in order for it to be replicable. It is suggested that the student mention how the ethogram will be used and that they specify the kind of sampling technique that will be used, instead of stating “observing” so that the investigation can be repeated. In addition, the student could strengthen the procedure by mentioning the number of times scanning will occur during each part of the day, explaining how to scan, and finally how often to scan. Providing a data collection sheet as supplemental to the procedure section is often helpful as well.

## **G. Data/Results**

**Score: 2** – *Most parts of the data graphs and tables are present, complete and accurate. Data analysis is attempted but may not be accurate.*

**Comments:** The student includes a data table which is labeled appropriately according to the ethogram, with most of the information precise around the observations and the graphs chosen accurately converted into percentages. This portion of the investigation could be improved by including statements of relationship on the data collected. For example, “the pie graph shows that average percentage of tufted puffins on land versus in the water is higher...” These types of statements help with the visualization of patterns and trends in the data and whether the investigations supports existing data or whether to run the study again.

## **Ha. Discussion/Conclusion: Scientific Explanation**

**Score: 2** – *Three or four parts of the Scientific Explanation are complete and accurate ((1) makes an overall claim addressing the original investigation question AND (2) supports the claim with evidence and relevant, accurate data from the investigation AND (3) contains relevant scientific concepts AND (4) uses words, phrases and clauses that clarify and connect the relationships between claim, evidence and science concepts AND (5) demonstrates an understanding of the topic.)*

**Comments:** The student made an accurate claim (the answer to the investigation question based on the student’s data) that Tufted Puffins will spend an increased amount of time on land than water, according to their evidence (63% were on land in the morning and 69% were on land during the afternoon). The student also uses a summative statement connecting the background research (which indicates that Tufted Puffins are on land more during their breeding season) to the dates the students conducted their trials in the spring months. It is recommended that the student state this information earlier in the scientific explanation and more explicitly to make the relationship between the breeding season and the evidence clearer, since the original investigation question really involves looking at time of day rather than time of year.

## **Hb. Discussion/Conclusion: Reflection**

**Score: 3** – *Conclusion contains thoughtful, relevant, and reasonable reflections including (1) states whether the hypothesis was or was not supported AND (2) a description of possible sources of*

error AND (3) suggested solutions to these sources of error AND (4) “Next Steps” determined as a result of this investigation.

**Comments:** The students accounted for a mathematical error in one of the data charts and suggested how to re-scan when a viewing error occurs. The students also included a “next steps” to study tufted puffins’ breeding season which may affect why there is a preference for land vs. water. These ‘next steps’ are important to consider to make the connection of time of year of the class trip visit and why students observed a certain behavior at a certain time of the year.

**I. Literature Cited**

**Score: 2 –** Most parts of the Literature Cited are complete and accurate. Bibliography is present, but references are not cited in the text of the investigation.

**Comments:** The students listed 6 appropriate and varied sources for their project, including Widescreen Arkive <http://www.arkive.org/> but only 1 was cited throughout the study. Utilizing different references would lend more supporting evidence for the hypothesis and results discussion. Another additional source that could be useful for anyone completing an Animal Behavior Field Study is Animal Diversity Web <http://animaldiversity.org/>

Project Section	Score (0-3)	Weight	Weighted Score
A. Title	3	x 1	= 3
B. Question	3	x 1	= 3
C. Hypothesis	2	x 2	= 4
D. Background Research	2	x 2	= 4
E. Investigation Design (ID)	2	x 2	= 4
F. Procedure	2	x 2	= 4
G. Data/Results	2	x 3	= 6
Ha. Discussion/Conclusion: Scientific Explanation	2	x 2	= 4
Hb. Discussion/Conclusion: Reflections	3	x 1	= 3
I. Literature Cited	2	x 2	= 4
		Total weighted score	= 39 (54 max)
	Final Score (%) =	=Total weighted score/54 x 100	= 72%