

## Appendix

### Sample Preassessment (student completed sample)

Name: [REDACTED] Date: 10/20/17 Class Period: 1

**Homework:**

- Download the Google Earth application from your cellphone's app store (it's a free app).
- Have your parent/guardian sign the waiver on the back of this paper
- Answer the following pre-lab questions to the best of your abilities.

1. Define carrying capacity: how the sustainable # of a species population

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2. Below, list three factors that affect the carrying capacity of an ecosystem:

- mortality
- natalibg
- immigration

3. Demonstrate your understanding of a logistic growth curve by drawing and labeling the graph below.

**Logistic Growth Curve**

### Pre-assessment/Rubric:

**Carrying Capacity Lab Pre/Post Assessment Rubric**

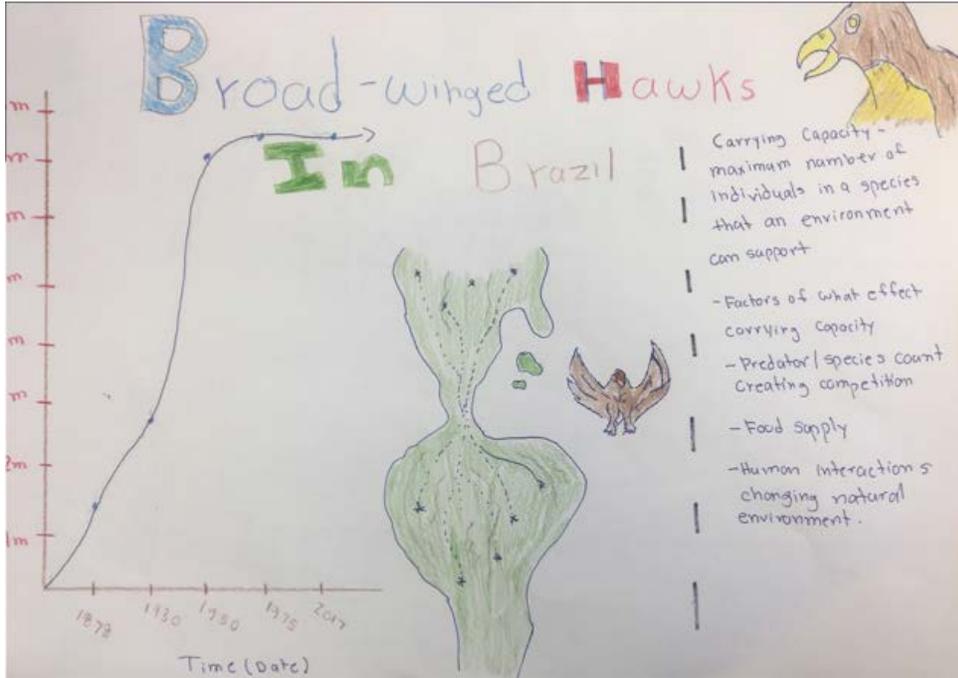
Student Name: [REDACTED]

Pre or  Post

CATEGORY	4	3	2	1
<b>Define Carrying Capacity</b>	Student defined carrying capacity with high accuracy.	Student defined carrying capacity with medium accuracy.	Student defined carrying capacity with low accuracy.	Student did not define carrying capacity.
<b>List 3 factors that affect carrying capacity</b>	Student accurately listed 3 factors that affected carrying capacity.	Student accurately listed 2 factors that affected carrying capacity.	Student accurately listed 1 factor that affects carrying capacity.	Student did not list any accurate factors affecting carrying capacity.
<b>Demonstrate your understanding of logistic growth.</b>	Student had high accuracy when drawing a logistic growth curve.	Student had medium accuracy when drawing a logistic growth curve.	Student had low accuracy when drawing a logistic growth curve.	Student did not attempt to draw a logistic growth curve.

5/12

Sample Post assessment (student completed sample)



Post-assessment/Rubric:

**Carrying Capacity Lab Pre/Post Assessment Rubric**

Student Name: [REDACTED]

Pre or Post ?

CATEGORY	4	3	2	1
<b>Define Carrying Capacity</b>	Student defined carrying capacity with high accuracy.	Student defined carrying capacity with medium accuracy.	Student defined carrying capacity with low accuracy.	Student did not define carrying capacity.
<b>List 3 factors that affect carrying capacity</b>	Student accurately listed 3 factors that affected carrying capacity.	Student accurately listed 2 factors that affected carrying capacity.	Student accurately listed 1 factor that affects carrying capacity.	Student did not list any accurate factors affecting carrying capacity.
<b>Demonstrate your understanding of logistic growth.</b>	Student had high accuracy when drawing a logistic growth curve.	Student had medium accuracy when drawing a logistic growth curve.	Student had low accuracy when drawing a logistic growth curve.	Student did not attempt to draw a logistic growth curve.

12/12 Great Job!

## Sample Powerpoint Slides:

### What is a Broad-winged Hawk?

- *Buteo platypterus*
- Raptor
  - Hooked bill
  - Talons
  - Binocular vision
- “Buteo” genus
  - Broad wings
  - Fanned Tail
  - Adept at soaring
- Small
  - 35-49 cm tall (14-19 in.)
- Wingspan
  - ~1 meter (~ 3 feet)
- Black and white bands on tail
- Dark coloration



Figure 2: “Abbo” an adult Broad-winged Hawk.

### Your Task:

- Assess Abbo’s long migration on Google Earth
- Investigate her nesting grounds
- Explore the ecological niche’s she inhabits

#### Complete “DO NOW” #3

What factors influence a bird’s choice about which environment to inhabit?

Sample of Lesson Activity Worksheet:

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

**Carrying Capacity Activity Guide**

*Carrying capacity* is the maximum number of individuals in a species that an environment can support for the long term. Let's talk about space requirements. Look at Figure 1, and answer the question that follows:



Figure 1

**1. Estimate how much space you think a Broad-winged Hawk needs during the nesting season [in sq. km and sq. mi]? This includes area used for foraging. [Conversion factor: 0.386 mi<sup>2</sup> = 1.0 km<sup>2</sup>]**

\_\_\_\_\_ km<sup>2</sup>  
\_\_\_\_\_ mi<sup>2</sup>

**2. Abbo chose to build her nest in rural Pennsylvania. What factors do you think influence a bird's choice about which environments to inhabit?**

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**3. Look at the Google Earth data for ABBO on your phones. Zoom in to the northernmost points.**

**Pre-Questions:**

**Birds, alongside bats and insects, have the extraordinary ability of flight. Please answer the following questions to see how acquainted you are with their abilities.**

1. How do species of birds differ in their flight patterns? List as many differences as you can.

2. How might studying these different patterns be beneficial to man? Can you think of any specific examples? List them.

**ADAPTATIONS FOR BIRD FLIGHT**

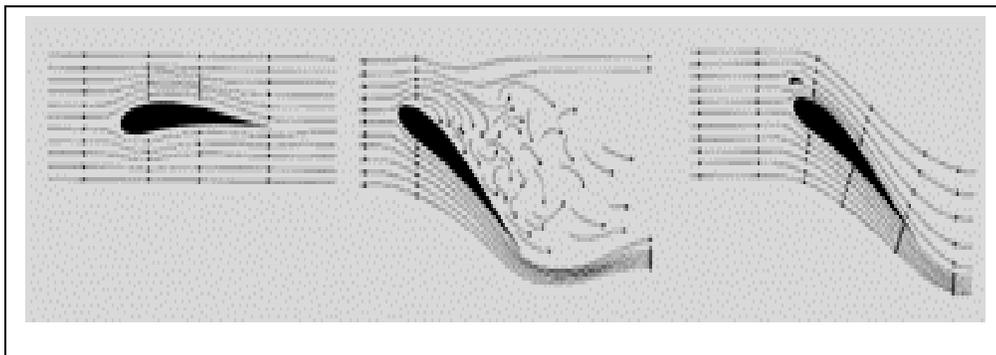
**In your group, as you try to figure out which bird wing belongs to which bird, go through the following readings and questions to help you.**

**I. Bird Flight and Wing Shape**

Read this article and answer the questions that follow as you try to figure out which wing belongs to which bird . <http://www.nhm.org/birds/guide/pg018.html>

1. Name the four main forces that affect the flight of a bird.
2. What is lift?
3. What is drag?
4. What is the general shape of a bird's wing? \_\_\_\_\_

5. Study the diagram:



Explain how the low pressure zone along the upper surface of the wing is created and thus causes the wing to be sucked up.

## II. Bird Flight

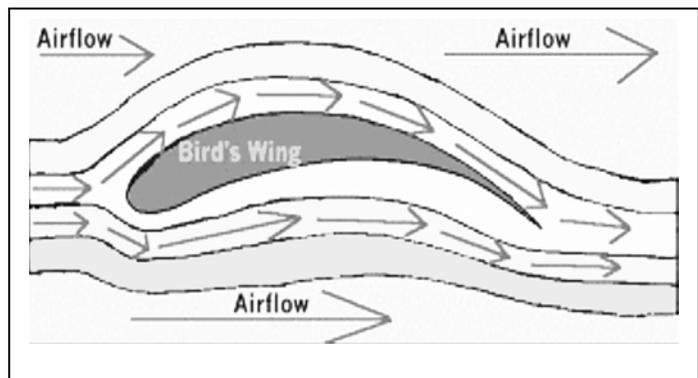
Read the following article <http://www.earthlife.net/birds/flight.html>

1. What governs the dynamics of bird flight? \_\_\_\_\_

2. Flying is a balance between what two sets of forces?

\* \_\_\_\_\_  
\* \_\_\_\_\_

3. What shape is a bird's wing? \_\_\_\_\_ How does this affect lift?



4. The most efficient wings are those which supply \_\_\_\_\_ while reducing \_\_\_\_\_. Two examples of birds with this wing shape are \_\_\_\_\_ and \_\_\_\_\_.

5. What is aspect ratio's definition?

6. What is the formula for wing loading?

7. What are passerine (songbirds) and pheasants adapted for?

8. What are waders (blue heron) adapted for?

9. What are eagles and vultures adapted for?

10. What are albatrosses adapted for?