



# At the Top: A Bald Eagle's Diet

Pamela B. Blanchard  
based on Lesson #9 published in Blanchard, P.B., and Conover, P. (2010). *Louisiana's Bird Curriculum*. Barataria-Terrebonne National Estuary Program (btnep.org), <http://lacoast.gov/new/Ed/Curriculum/LouisianasBirdsCurriculum.pdf>

## Focus on Inquiry

The student will collect data about a Bald Eagle's diet over five days.

## Lesson Overview

This activity asks students to become scientists who are studying the components of a Bald Eagle's diet. They will collect data by pulling prey chips from an envelope and recording this data. They then graph, draw conclusions about what a Bald Eagle eats based on their research data and share their conclusions with the class.

<b>Duration</b> 45 minutes	<b>Setting</b> Classroom	<b>Grouping</b> 2 students per group	<b>PTI Inquiry Subskills</b> <b>3.1, 3.7, 4.2, 5.2, 5.3, 7.2, 7.3</b>
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Lesson Components	Estimated Time	Inquiry Subskills Used	Technology Used	Level of Student Engagement	Brief Description
<i>Engage</i>	5 min	3.1	Internet video	2	Students watch a video and make observations of a Bald Eagle catching prey.
<i>Explore</i>	20 min	3.1, 3.7, 4.2, 5.2	none	3	Students collect data by pulling prey cards to model what a Bald Eagle eats.
<i>Explain</i>	10 min	7.2, 7.3	none	3	Students graph their data and draw conclusions about the type of animals a Bald Eagle eats.
<i>Expand</i>	5 min	5.3	none	2	Students discuss how they would expect the type of animals to change if the Eagle lived in a different habitat.
<i>Evaluate</i>	5 min	-	none	1	Students will complete a worksheet as they collect and graph their data.

### Level of Student Engagement

1	Low	Listen to lecture, observe the teacher, individual reading, teacher demonstration, teacher-centered instruction
2	Moderate	Raise questions, lecture with discussion, record data, make predictions, technology interaction with assistance
3	High	Hands-on activity or inquiry; critique others, draw conclusions, make connections, problem-solve, student-centered

## Next Generation Science Standards – Inquiry

Practice 3 – Planning and carrying out investigations  
Practice 4 – Analyzing and interpreting data  
Practice 5 – Using mathematics  
Practice 6 – Constructing Explanations  
Practice 7 – Obtaining, evaluating and communicating information



## Next Generation Science Standards – Life Science

MS-LS2-1 - Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.



## Florida Science Standards – Nature of Science

SC.7.N.1.1 - Carry out scientific investigations of various types, such as systematic observations or experiments; identify variables; collect and organize data; interpret data in charts, tables, and graphics; analyze information; make predictions; and defend conclusions.

## Florida Science Standards – Life Science

SC.7.L.17.2 - Compare and contrast the relationships among organisms, such as mutualism, predation, parasitism, competition, and commensalism.

## Materials and Advance Preparation

### Materials List

- Prey cards (1 set per student) - see Advance Preparation, Step 1
- Envelopes or paper bags (1 envelope per student)
- **Blackline Master #2** (1 copy per student)

### Blackline Masters

1. **Bald Eagle Prey Chips**
2. **Bald Eagle Diet Investigation (two pages)**

### Advance Preparation

1. Print out **Blackline Master #1 (Scenario 1)**, one per pair of students. Cut the 20 prey cards apart and place them in an envelope. Mark these envelopes as **SCENARIO 1**.
2. Print out **Blackline Master #1 (Scenario 2)**, one per pair of students. Cut the 20 prey cards apart and place them in an envelope. Mark these envelopes as **SCENARIO 2**.
3. Run 2 copies of **Blackline Master #2** for each student (one for Explore and one for Expand).
4. Make sure you can view the Engage video: *BBC Nature's Great Events - The Great Salmon Run* (<https://www.youtube.com/watch?v=hecXupPpE9o>). **IMPORTANT NOTE:** *Make sure to fast forward past the advertisements and display the video "whole screen" so that the web page advertisements located on the right-hand side and underneath the video will not be seen. In addition, please be on the lookout for "pop up" ads while the video is playing.*

## Lesson Information

### Learning Objectives

The learner will...

- collect data (prey chips), sort them into categories, and record them on their data sheet with 100% accuracy.
- correctly express data graphically using a bar graph, label x- and y-axes appropriately, and put a title on their graph.
- draw appropriate conclusions about the diet of the Bald Eagle based on the data collected in this activity by writing at least one or two sentences about their data regarding the Bald Eagle diet.
- clearly communicate their conclusions by sharing their graphs and reading/reciting their conclusions based on their graphed data.

### Prior Knowledge Needed by the Students

- how to construct and analyze bar graphs
- predator-prey relationships
- ability to make observations from a video about Bald Eagle adaptations as well as general observations
- basic knowledge of food chains
- knowledge of how to calculate an average

### Background Information

Bald Eagles (*Haliaeetus leucocephalus*; *haliaeetos* (Greek) - "sea eagle"; *leucocephalus* (Greek) - "white-headed") are **carnivores** and **opportunistic** feeders. This means that they will eat whatever meat they happen upon, whether it is alive or dead (**carrion**). They will take food (alive or dead) from smaller birds if the opportunity presents itself.

Since Bald Eagles typically live near coastlines, their diet often consists largely of fish. Researchers in a study of nesting Bald Eagle diets in the lower Chesapeake Bay, found that fish constituted 94.1% of the **biomass** delivered, birds 1.0%, mammals 4.1%, and reptiles 0.9% (Markham and Watts, 2008). In another study in Vancouver, British Columbia, researchers reported that the diet of the Bald Eagles studied there consisted of 52% birds (mostly Gulls), 34% fish (mostly Ling Cod and rockfish), 12% marine invertebrates (mostly crabs and clams), and 2% mammals (mostly carrion) (Vermeer et al. 1989). Sometimes, Bald Eagles' diets vary even in a relatively small geographic area. For instance, on Adak and Tanaga Islands in the Aleutian Islands, fish made up most (56%) of the Bald Eagle diets, then birds (25%)

and mammals (19%), while on Amchitka and Kiska Islands, birds comprised the majority (60%) of bald eagle diets, followed by mammals (30%) and fish (10%) (Anthony et al., 1999). In another research study conducted in Yellowstone National Park, the research found that Bald Eagle's diet consisted of birds (57%, of which 36% were waterfowl), fish (25%), and mammals (18%) (Swenson, 1975). The average daily food consumption for an average size Bald Eagle (9-14 pounds) is from 250-550 grams per day (0.5-1.5 pounds per day), or between 5-10% of an eagle's body weight.

### Background References for Further Reading

- Anthony, R.G., Miles, A.K., Estes, J.A., and Isaacs, F.B. (1999). Productivity, diets, and environmental contaminants in nesting bald eagles from the Aleutian archipelago. *Environmental toxicology and chemistry*, 18 (9): 2054-2062; accessed January 10, 2009 at <http://cat.inist.fr/?aModele=afficheN&cpsidt=1939043>
- Markham, A.C. and Watts, B.D. (2008). The influence of salinity on the diet of nesting Bald Eagles. *Journal of Raptor Research*, 42(2):99-109.
- Pitt, R. (December 01, 2007). Food habits of the Bald Eagle. *Hancock Forum Newsletter*, 6, obtained January 10, 2009, at <http://www.hancockwildlifechannel.org/article.php/20071201141457798>
- Swenson, J.E. (1975). Ecology of the Bald Eagle and osprey in Yellowstone National Park. (Unpublished Masters Thesis). Montana State University, Bozeman, MT.
- Vermeer, K, Morgan, K.H., Butler, R.W, and Smith, G.E.J. (1989). Population, nesting habitat and food of Bald Eagles in the Gulf Islands. In K. Vermeer et al. (eds.). The ecology and status of marine and shoreline birds in the Strait of Georgia, British Columbia, p. 123-130. Environment Canada/Canadian Wildlife Service, Ottawa, Ontario, Canada.

## Lesson Procedure

### Engage

- To introduce the lesson, explain to students that they are going to be wildlife biologists who will be going out to the field in the near future. In order to prepare for this field work, ask students the following questions.
  - Have any of you ever seen a wild Bald Eagle? [*Student response: various.*] Share what you observed about the Eagle.
  - Have you ever seen a Bald Eagle catch something to eat? [*Student response: various.*] What **adaptations** does a Bald Eagle have that might help it be efficient at catching its food? [*Student responses: Bald Eagles are large birds. They have a white head and tail. They like to live near water.*]
- Watch a short video (52 seconds) of a Bald Eagle fishing. [Show the fragment of video from BBC Nature's Great Events - The Great Salmon Run (<https://www.youtube.com/watch?v=hecXupPpE9o>), which shows how an American Bald Eagle catches a salmon out of the water in full flight. *NOTE: Make sure to fast forward past the advertisements and display the video "whole screen" so that the web page advertisements located on the right-hand side and underneath the video will not be seen. In addition, please be on the lookout for "pop up" ads while the video is playing.*
  - What do you observe about how the Bald Eagle fishes? (**PTI 3.1**) [*Student responses: Bald Eagles have talons that are long and sharp that help them securely hold their food. They have powerful wings that can help them soar swiftly and can help them lift large prey that they've caught. They have excellent eye sight and can spot prey from far off. In addition, they can compensate for the refraction of light caused by water, so they can accurately know where to catch the fish that is under the water.*]
  - What does the Eagle catch? [*Student responses: This Bald Eagle caught a salmon.*]
  - Do you think the Eagle woke up that morning and decided he or she would catch that particular fish? (Introduce the concept of **opportunistic feeder**).
- Optional:* Watch a second short video of a Bald Eagle eating a fish (<https://www.youtube.com/watch?v=l9Wpzw-NL2k>).
  - What additional observations can you make about a Bald Eagle after watching this film? (**PTI 3.1**)

### Explore

- In this activity students will be scientists investigating the type of prey that a Bald Eagle eats over five days of field work. While this is observational research and not experimental that is performed in the classroom, it is still appropriate to review with students the distinction between

- dependent variables* (the things we observe; in this case, the type of prey) and the *independent variables* (the things that we intentionally change; in this case, the days of the week).
- Distribute **Blackline Master #2** (one per student) and an envelope of prey chips (one envelope per pair of students). Have the students follow the directions on **Blackline Master #2**. Students should accurately record their data in the data table each time they pull a prey card. Students need to return the prey card back to the envelope *prior* to pulling the next chip. Students will make 10 observations for each of the five days (i.e., pull 10 prey chips one at a time and record them). **(PTI 3.1, 3.7)**
  - As students complete their observations, encourage them to begin to graph their data **(PTI 4.2)**, if necessary, review the distinction between continuous data and categorical data. Continuous data can be subdivided into fractional units that make sense (like temperature (98.6°F), time, mass, etc.), while categorical data (like days of the week and varieties of fruit, are not divided into smaller units that make sense... for instance, it is hard to have "Monday.5").  
Remind students of how to construct a bar graph. On the x-axis they will put the various types of prey categories they had. Above the prey category, they will construct a bar that indicates how much of that prey is represented in their data. All graphs should have x- and y-axis labels, y-axis scale, and a title.
  - Have students write a one or two sentence conclusion based on the data they collected and graphed. **(PTI 5.2)**

### Explain

- Have students share their graphs with the class and orally describe the types and numbers of foods that their Bald Eagle ate. **(PTI 7.2, 7.3)**
- Some questions you might ask students include,
  - Show us your graph and tell us what you learned from your data?
  - Did anything surprise you about what Bald Eagles might eat? [*Some students might report that they are surprised that they eat other birds.*]
  - Are Bald Eagles predators or prey. [*Bald Eagles are predators.*] Explain your answer. [*They are rarely eaten by other larger animals.*]
  - Based on your data, are Bald Eagles producers, consumers or decomposers? [*consumers*]
  - How would you describe how Bald Eagles choose what they decide to eat? [*They eat whatever they can find.*]
  - Can anyone suggest a name for this type of predator? [*This type of predator is an opportunistic predator.*]
  - Can anyone put into their own words a definition for *opportunistic predator*?
  - Where is a Bald Eagle located in a food web or food chain? [*At the top.*] Why are they located there? [*It is rare that they become someone else's dinner.*]
  - What type of habitat do you think your Bald Eagle lived in? Was it near an ocean? in the mountains? **(PTI 5.3)**
  - What evidence do you have to support your claim?

### Expand

- Hand out **Scenario 2 envelope** and another data collection table (**Blackline Master #2**). Follow the same procedure as with the first scenario/envelop.
- Have students compare their graphs from Scenario #1 and #2.
  - What are the similarities between your field data? [The Bald Eagle ate fish, mammals and birds in both Scenarios.] What are the differences? [The Bald Eagle ate fewer fish, and more mammals and birds in Scenario 2. We didn't record any invertebrates in our data or reptiles.]
  - What type of habitat do you think your Bald Eagle lived in in Scenario 2? Was it near an ocean? in the mountains? What evidence do you have to support your claim? [*In Scenario 2, the Bald Eagle lived further from water.... Possibly in the mountains. I can support this claim because there are far fewer fish in this Bald Eagle's diet.*] **(PTI 5.3)**
  - Draw a Venn Diagram that shows the similarities and differences between your two data sets.

**Evaluate**

1. Graphs and completed worksheet (**Blackline Master #2, Scenario 1 and 2**) can be graded based on whether the student correctly grouped and counted the different types of prey that the Bald Eagle eats.

**Supplementary Resources****Teachers**

*Teaching Science with Mrs. Dempsey: Ecology* (no date). Retrieved from <http://teachingscience.homestead.com/ecology.html>

*A month-long unit on Ecology that incorporates a number of online activities and games centered around ecology.*

*National Geographic Wild: Bald Eagle Natural History* (HD video).

<https://www.youtube.com/watch?v=6fRboR1ZDug>

*Follows a life of a pair of Bald Eagles through hunting, winter, nesting season.*

**Students**

Fowler, Allan. (1992). *So That's How the Moon Changes Shape* (Rookie Read-About Science Series) Chicago: Children's Press. 31 pp. ISBN: 0516449176

*A simple explanation of the moon and why it changes shape throughout the month. Ages 4-8.*

**Miscellaneous**

New Hampshire Public Television: NatureWorks Series

<http://www.nhptv.org/natureworks/nwep.htm>

*Has multiple links that explain food webs (Episodes 9, 10, and 11).*

Marietta College Environmental Biology

<http://www.marietta.edu/~biol/102/ecosystem.html>

*Info about food webs and biomagnification. At good level for middle school.*

Interesting Facts about Food Chains

<http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/F/FoodChains.html>

*Thorough discussion of energy flow through food chains.*

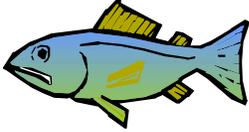
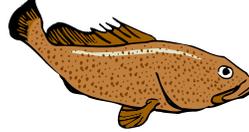
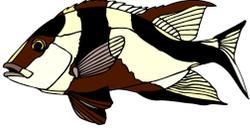
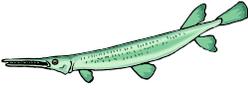
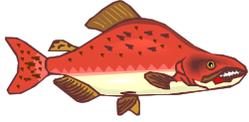
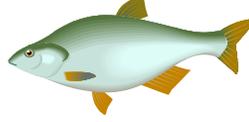
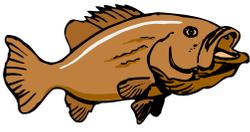
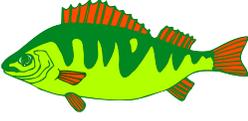
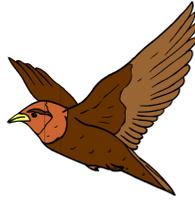
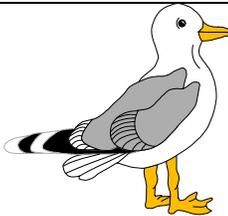
**Other resources**

Kennedy, P. (2007). *Fun with Birds of Prey Stencils*. Dover Publications, 6 pp.

*Create realistic drawings of a Condor, Bald Eagle, Screech Owl, Peregrine Falcon, Osprey, and Swallow-tailed Kite with six brightly colored open stencils. Age Range: 4 to 6 years.*

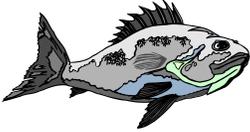
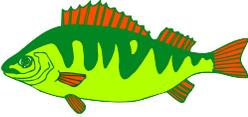
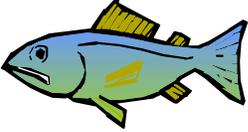
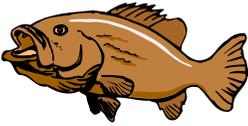
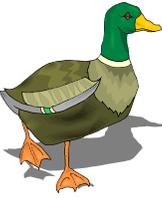
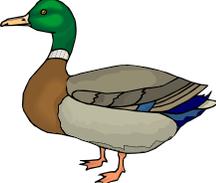
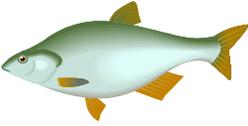
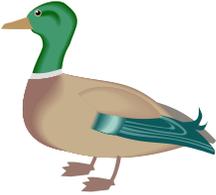
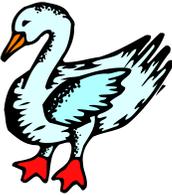
Blackline Master #1

Scenario 1  
Bald Eagle Prey Chips

 Fish	 Fish	 Fish	 Fish
 Fish	 Fish	 Fish	 Fish
 Fish	 Fish	 Fish	 Bird
 invertebrate	 mammal	 Bird	 Bird
 snake	 mammal	 Bird	 Bird

Originally from the Barataria-Terrebonne National Estuary Programs Louisiana's Bird Curriculum (2010)

Scenario 2  
Bald Eagle Prey Chips

 Fish	 Fish	 Fish	 Fish
 Bird	 Bird	 Bird	 Fish
 Bird	 Bird	 Bird	 Bird
 Bird	 Bird	 Bird	 Bird
 mammal	 mammal	 mammal	 mammal

New Scenario created for Osceola MSP 2015.

Student Name \_\_\_\_\_

**Bald Eagle Diet Investigation: Scenario # \_\_\_\_\_**

Based on the Barataria-Terrebonne National Estuary Programs *Louisiana's Bird Curriculum* (2010)

**Instructions.** You are a researcher who is studying Bald Eagles' diets. Every time you observe a Bald Eagle eating, you must record the type of prey in your field notebook.

STEP 1. To simulate a Bald Eagle hunting, you will draw a prey chip out of your chip bag. The animal on the chip has fallen prey to the Bald Eagle. Record the category of animal that is on the chip on the day of your observation by placing a tally mark in the correct column and row of your data table. Return this food chip to the paper bag. You will begin your observations on "Monday." Shake the bag and draw another food chip. Record your data below. Do this 10 times on each of the five "days" you observed the Bald Eagle.

STEP 2. Calculate the average number of birds, fish, snakes, mammals and invertebrates that fell prey to your Eagle for each of your five days.

Independent variable	Dependent Variable				
	bird	fish	snake	mammal	invertebrate
Observation Day					
Day 1					
Day 2					
Day 3					
Day 4					
Day 5					
Average over five days					

**Blackline Master #2 (con't)**

STEP 3. Create a bar graph to display your daily averages of each of the types of prey that your Bald Eagle dined on over the course of the five days of your observations. Remember to put a title on your graph and to label both the x and y axes. Since your data is in five categories or types, you will use a bar graph to display your data rather than a line graph.


STEP 4. Looking back over your table of data and above at your graphed data, describe what your data tells you about your Bald Eagle's diet over the five days of your observation.

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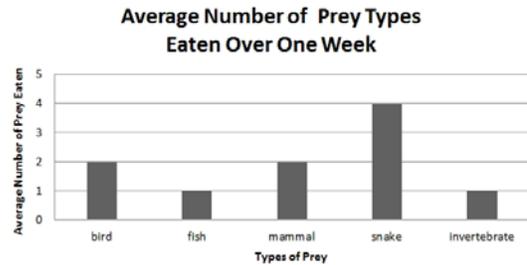
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**Blackline Master #3**

Student Name \_\_\_\_\_

## Evaluation: Bald Eagle Diet Investigation

1. The graph to the right reflects data collected by a scientist who observed what a Bald Eagle ate during one week of field work. Looking at the data taken from her field notebook, write a sentence about what this data tells us about this Eagle's diet. (SC.7.N.1.1; PTI 4.4)




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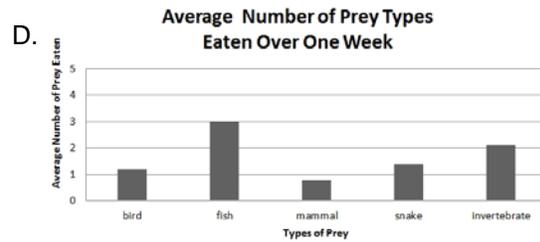
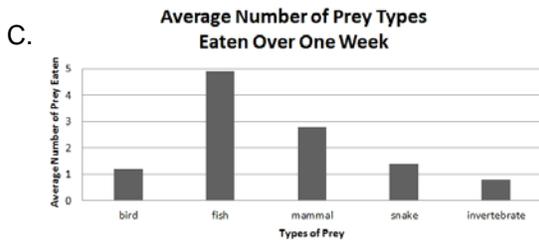
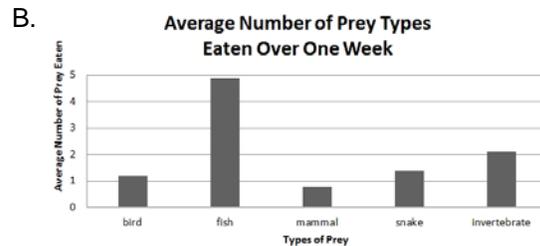
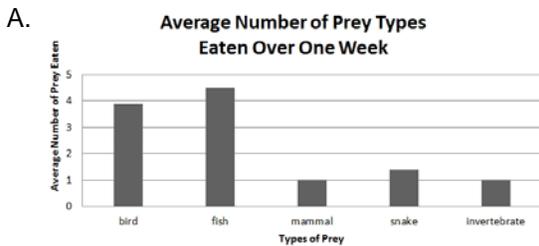
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2. Which of the following terms best describes the Bald Eagle's eating habits? (SC.7.L.17.2)  
 A. cannibalistic    B. opportunistic    C. parasitic    D. mutualistic
3. A scientist studying another Bald Eagle's diet 200 miles away collected data over 5 days. His data chart is below. Which graph best represents his data? (SC.7.N.1.1, PTI 4.2)

Observation Day	bird	fish	mammal	snake	invertebrate
Average over 5 days	1.2	4.9	0.8	1.4	2.1



4. Back at the lab, scientists compared the two sets of data (Question 1 and Question 4). What inference can you draw about the habitat of the Bald Eagle in Question 4? (SC.7.N.1.1, PTI 5.3)

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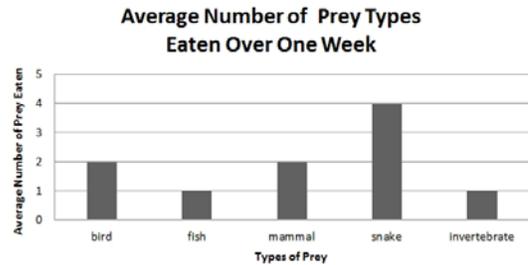
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Student Name \_\_\_\_\_

### Evaluation: Bald Eagle Diet Investigation

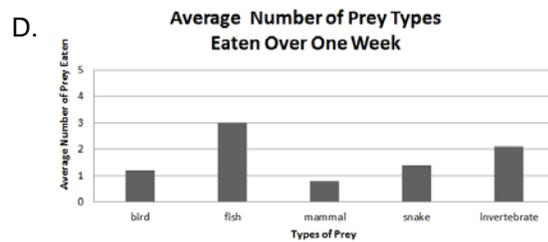
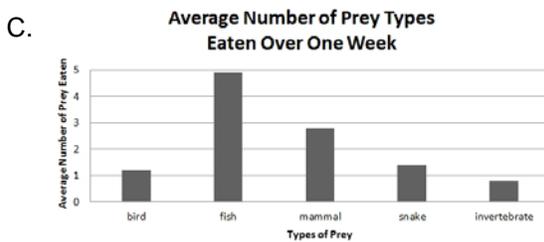
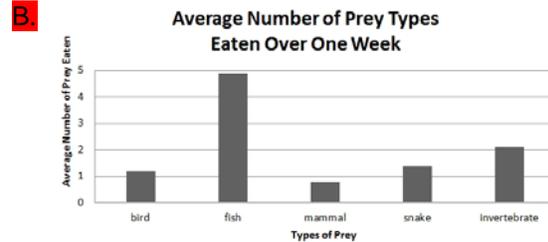
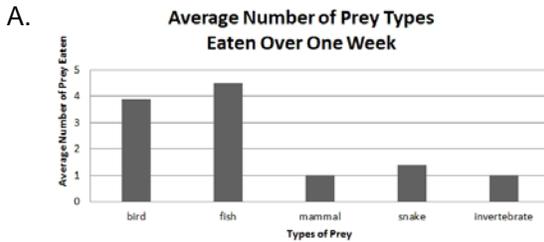
1. The graph to the right reflects data collected by a scientist who observed what a Bald Eagle ate during one week of field work. Looking at the data taken from her field notebook, write a sentence about what this data tells us about this Eagle's diet. (SC.7.N.1.1; PTI 4.4)

***This Bald Eagle predominately ate snakes as its main food source.***



3. Which of the following terms best describes the Bald Eagle's eating habits? (SC.7.L.17.2)  
 A. cannibalistic B. **opportunistic** C. parasitic D. mutualistic
4. A scientist studying another Bald Eagle's diet 200 miles away collected data over 5 days. His data chart is below. Which graph best represents his data? (SC.7.N.1.1, PTI 4.2)

Observation Day	bird	fish	mammal	snake	invertebrate
Average over 5 days	1.2	4.9	0.8	1.4	2.1



5. Back at the lab, scientists compared the two sets of data (Question 1 and Question 4). What inference can you draw about the habitat of the Bald Eagle in Question 4? (SC.7.N.1.1, PTI 5.3)
- In the first location, Bald Eagles ate more snakes than anything else. In the second location they ate more fish. This information leads to the inference that Location 1 was a relatively dry place, while Location 2 was a place with more access to fish, like a lake or the ocean.***