Mark and Recapture: Learning about Pennsylvania Black Bears and Their Management

Student Worksheet

Name: _____   Date: _____

Directions: Using information from the Black Bear Management PowerPoint and the Black Bear Wildlife Note, answer the questions.

Multiple Choice

1. What agency manages Pennsylvania black bears? A. Pennsylvania Fish and Boat Commission B. Pennsylvania

   Department of Conservation and Natural Resources C. Pennsylvania Game Commission

2. A _____ trap is used to catch black bears.   A. Clover   B. Corral   C. Culvert

3. To determine the age of the bear, a small premolar tooth is removed.   A. True   B. False

4. Trapping and processing a black bear has a lasting effect on black bears. A. True   B. False

Fill in the Blank

Choose from these words:

alert	carnivorous	regulated hunting	dusk and dawn	night
vegetarian	cinnamon	fall foods	purple	habitat

5. Not all black bears are black. Some Pennsylvania bears may be a _____ color.

6. Bears are most active at _____, but they may become nocturnal to avoid human activity.

7. Bears are omnivores, but a large portion of their diet is _____.

8. The availability of _____causes the onset of hibernation to vary from year to year.

9. During hibernation, bears are _____ and capable of fleeing or defending the den.

10. _____ is the method used to manage black bear populations in Pennsylvania.

Student Worksheet

Name: _____   **Date:** _____

Directions: Use the instructions and materials provided (bear headband, set of paper "bear and ear-tags", string, ruler, and 2 paperclips/stapler) to process your pseudo caught bear and fill out the field data sheet.

Instructions: Congratulations! You caught your first bear today. While the bear is tranquilized, you will need to process the bear and record the information collected on the field data sheet. You get to decide some of the information, such as gender and bait used. The string represents chest tape. In real-life, bear biologists estimate the bear's weight by measuring the girth of the bear, just behind its shoulders, using a tape measurer. That length is then entered into a formula to estimate the bears weight. For this activity, you will measure your string and use the bear weight chart to determine the bear's estimated weight.

The last thing you will need to do is ear-tag the bear. If cubs were present you would ear-tag them as well, but for this activity they are not. Prior to placing the ear-tag in the ear, you will need to record the ear-tag numbers on your data sheet. The lower number will go in the left ear. To ear-tag the bear, attach each ear-tag to the bear's ear using a paper clip (numbers should be on the outside of the bear's ear). In real-life, on an adult bear, a tooth (first premolar) is pulled to be sent to a lab to age the bear. After the bear has been processed and tagged, it is monitored until it "wakes-up". If this bear was a nuisance bear, it will be release at the nearest State Game Land. If the bear was caught for research, it will be released on site. Bears tagged after the last day of the Statewide Firearms Season until the day prior to next year's Statewide Firearms season, will be used to help estimate the Pennsylvania Bear Population.

(Pseudo) Black Bear Weight Chart			
Girth (in.)	Live Weight (lbs.)	Girth (in.)	Live Weight (lbs.)
1	140	7	290
2	160	8	310
3	190	9	340
4	210	10	360
5	240	11	390
6	260	12	420

(Pseudo) Black Bear Capture Field Data Sheet

Collector: _____   Date: _____

Gender: _____   Cubs Present? _____

Type of Bait Used _____   Est. Weight: _____

Ear Tag? ☐   Left Tag: _____   Right Tag: _____

Release Site Location: _____

Notes: _____

Mark and Recapture: Estimating a Black Bear Population

Student Worksheet

Name: _____ **Date:** _____

Directions: Using the information below, answer the questions.

Capture Period Data (current year)	
Number of Black Bears Ear-tagged	703
Number of Black Bears with Ear-tags in Harvest	75
Total Number of Black Bears Harvested in the Current Year	2020

Lincoln-Peterson Equation:

$$\frac{R \text{ (Marked Re} - \text{captures)}}{T \text{ (Total in Second Sample)}} = \frac{M \text{ (Marked Initially)}}{N \text{ (Total Population)}}$$

$$N = \frac{M * T}{R}$$

Correction for Continuity Method:

$$\frac{R \text{ (Marked Re} - \text{captures)} + 1}{T \text{ (Total in Second Sample)} + 1} = \frac{M \text{ (Marked Initially)} + 1}{N \text{ (Total Population)}} - 1$$

$$N = \frac{(M+1) * (T+1)}{(R+1)} - 1$$

1. Using the information above, what is the estimated bear population using the Lincoln-Peterson Method? Show your work.

2. Using the information above, what is the estimated bear population using the Correction for Continuity Method? Show your work.

Directions: Write tag numbers on ear-tags. Cut out the black bear head and ear-tags. Fasten ear-tags to the bear's ears, putting the lowest number in the left ear.

Photo courtesy of: Jacob Dingel

Background Information:

Part 1: Black Bear Management /*Bear Management PowerPoint Notes

Slide 1

The Pennsylvania Game Commission manages all of Pennsylvania's wild birds and mammals, for current and future generations.
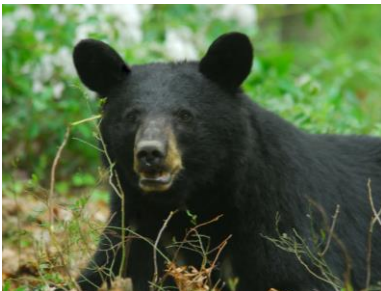
Slide 2

Pennsylvania is home to a population of approximately 20,000 black bears. Bears can be found in large forested areas statewide although, they are not as common in large urban or agricultural areas.

Slide 3

Bears are trapped for research or in areas where they have become a nuisance. In PA, we currently trap and tag about 700 bears each year. Typically nuisance bears are moved after capture, while research bears are released on site.

Slide 4

Bears are captured in a "culvert" trap. Inside the trap, there is a basket that is filled with bait. Often, traps are baited with donuts. When a bear pulls on the basket, a trigger releases the door and the trap closes.

Slide 5

Once a bear is caught, a tranquilizing drug is loaded into a jab stick. Small holes on the top of the trap allow for easy access. Care is taken to be sure that the needle is injected correctly.

Slide 6

The tranquilizing drugs prevent the bear from blinking. Eye drops and a blindfold are used to protect the eyes and keep the bear calm while being processed.

Slide 7

The weight of the bear is estimated by using a chest tape.

Slide 8

Metal tags with unique numbers are placed in both of the bear's ears using special pliers that close the tags.

Slide 9

Tags allow the bear to be identified in the event it is re-captured or harvested. This information allows us to study their range and distribution.
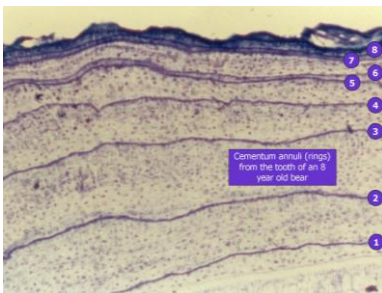
Slide 10

To determine the age of the bear, a small premolar tooth located directly behind the large canine tooth is removed. They are located on both sides of the top and bottom jaws and are not necessary for the bear to eat or survive.
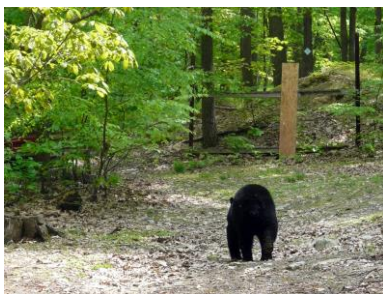
Slide 11

In a lab, a thin cross section is cut from the root of the tooth and placed under a microscope. Growth rings (called cementum annuli) are counted to determine the age, much like aging trees by counting their growth rings.

Slide 12

All of the data taken from the bear is recorded. Data includes tag numbers, weight, sex and location of where the bear was trapped. This information goes into a computer data base for future reference and research.

Slide 13

Even after the bear is processed, it is closely monitored until it "wakes up." The blindfold is removed and the bear is placed in a position to aid respiration and recovery.

Slide 14

Occasionally the bear is given a reversal drug to help it recover faster or it may be allowed to recover on its own.

Slide 15

Regardless of the method used, when the bear wakes up it is a little groggy and a bit shaky on its feet.

Slide 16

In a very short time, the bear is able to walk normally and heads for the bushes to take a nap and sleep off the remaining effects of the tranquilizing drug.

Slide 17

The entire experience has no lasting effect on the bear.

Slide 18

We hope you enjoyed the program!

Thank-you!
Pennsylvania Game Commission