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## Brooks River Brown Bears: Inheritance and Variation of Traits

● Introducing the Brown Bears

explore

Learning  
IN MOTION

## 1

## Introducing the Brown Bears



Students find out about the brown bears that fish for salmon along the Brooks River in Katmai National Park, Alaska, and are introduced to the Guiding Question. The class watches a video clip, views photographs, and observes the physical and behavioral differences between bears at different life stages. After learning definitions of traits, students work in pairs to categorize brown bears' specific traits as being either inherited or acquired.

**GUIDING QUESTION**

*Why are there differences between the ways individual brown bears look and act?*



## Lesson 1: Introducing the Brown Bears

### MATERIALS

#### Teacher Materials

- **Introducing the Brown Bears** visuals:
  - Katmai National Park and Preserve Map
  - Spring Cubs photograph
  - Older Cubs photograph
  - Subadult photograph
  - Adults photograph
  - Brooks River Highlight 1 video

#### Student Materials

- **Katmai Brown Bear Identification** handout (1 per student)
- Optional: **Katmai Junior Ranger Bear Years** handout (for Extension)

### LESSON PREPARATION

- Work with your school network administrator to make possible the viewing of videos and live bear cams from the Internet site [explore.org](http://explore.org).
- Prepare to project (or print one large classroom display copy of) the **Katmai National Park and Preserve Map** and the four photographs of bears in different life stages.
- Set up a means for students to view the **Brooks River Highlight 1** video.
- Print one copy of the **Katmai Brown Bear Identification** handout for each student.
- Optional: Print one copy of the **Katmai Junior Ranger Bear Years** handout for each student.




## Lesson 1: Introducing the Brown Bears

### OPENING

#### Introduce the Brooks River Brown Bear

1. Capture student interest by asking what they know about bears, such as the different kinds (species), where they live, how they behave, what they eat, and so on.
2. Let the class know they will be watching video of brown bears that have come to fish for migrating salmon along the Brooks River in Katmai National Park, Alaska.

3.  Display the **Katmai National Park and Preserve Map**.

- Point to the inset that shows the state of Alaska, and explain the state's location relative to the continental United States.
  - Point to the inset that shows Brooks Camp Vicinity, and trace the short length of the Brooks River.
4. Explain to students:
    - During the summer, the bears are super hungry because they haven't eaten during hibernation through the winter and spring. They must eat an entire year's worth of food in six months or less!
    - Bears gather at Brooks River because it's the first place salmon become available to bears in Katmai.
    - The waterfall on Brooks River makes a barrier the salmon have to jump over in order to continue swimming upriver to spawn. Brooks Falls is a kind of bottleneck where bears count on finding fish in the first half of the summer.



[Katmai National Park and Preserve map](#)

5. Tell the class that many of the same bears return year after year, and wildlife biologists know how to recognize them. Ask:
  - Can you think of ways the biologists might do that?

#### Introduce the Guiding Question

1. Write the Guiding Question on the board:



*Why are there differences between the ways individual brown bears look and act?*


2. Tell students that their goal is to observe bears' physical characteristics and behaviors and try to tell individual bears apart. They will practice by watching some video highlights of bears from past years.

## Lesson 1: Introducing the Brown Bears

### ACTIVITY

#### Watch Brown Bears

1. Give the class two questions to focus on as they observe the bears:
  - What differences in **physical appearance** do you notice between one bear and another?
  - What differences in **behavior** do you notice between one bear and another?

2.  Show the **Brooks Falls Highlight 1** video clip.

3. Have students turn and talk with a partner about their observations. Expect to hear students comment on the cubs' small size and darker color as compared to their mother and the cubs copying their mother by standing on hind legs.




Brooks Falls Highlight 1

#### Observe Physical and Behavioral Traits

1. Tell the class that wildlife biologists use a combination of physical and behavioral traits to identify individual bears. **Traits** are the thousands of characteristics that make someone an individual. For example, everyone in the class has physical traits of eye color and hair color; part of what makes each person unique are the differences between their hair and eye color and someone else's.
2. Ask the class:
  - How could you tell which bear(s) in the video were adults and which bear(s) were younger?
  - Did you use their physical traits, their behavioral traits, or both?



## Lesson 1: Introducing the Brown Bears

3.  Show the four photographs of bears at different life stages (**Spring Cubs**, **Older Cubs**, **Subadult**, and **Adults**). Encourage students to describe the differences they see between them. As a result of discussion, work with students to recognize that:

- Cubs in their first summer (spring cubs) are very small compared to their mothers. They usually have dark fur and can sometimes have a band of lighter fur around their neck.
- Cubs in their second and third summers are taller than spring cubs and usually have lighter fur than spring cubs do. They are still dependent on their mother and follow her where she goes.
- Subadult bears are generally small to medium-sized. They have lanky bodies, which can make them appear to have a big head and ears. A bear's coat generally darkens as it grows from a cub into an adult bear.
- Adult male bears grow twice (two times) as large as adult females.



a. Spring Cubs



b. Older Cubs



c. Subadult




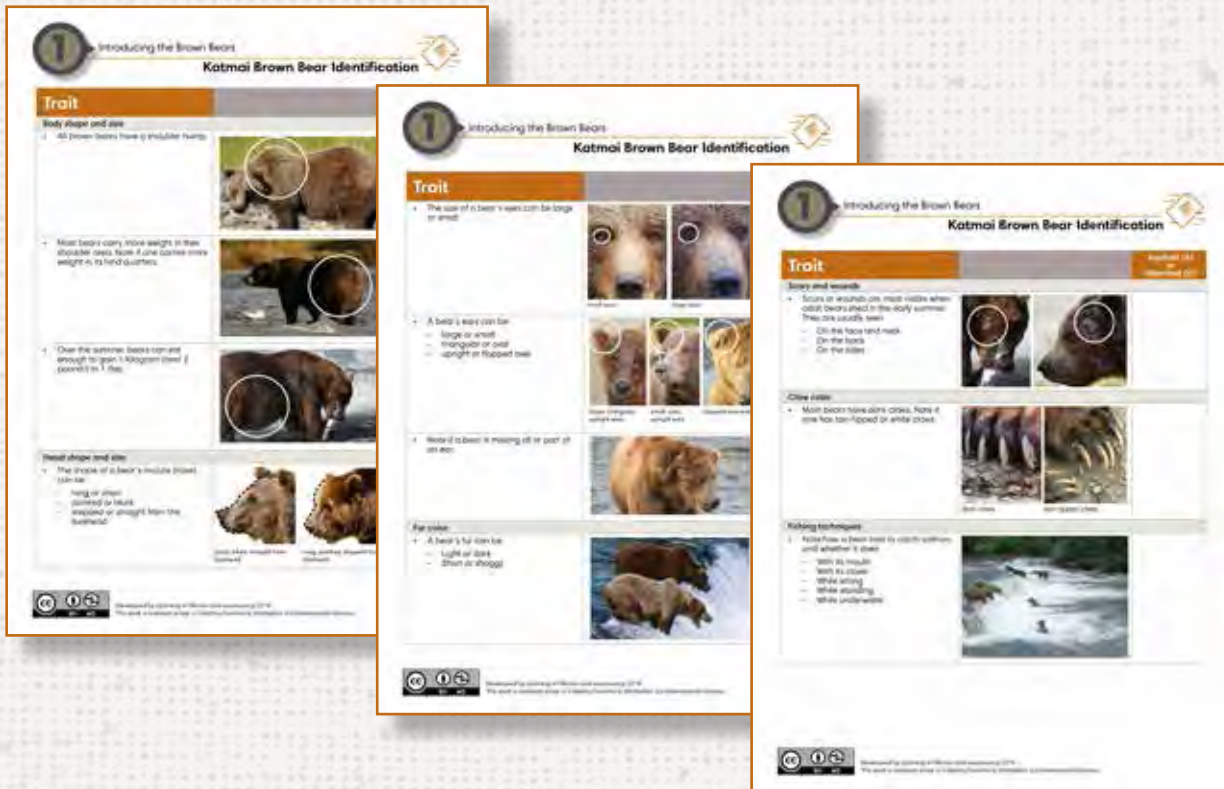
d. Adults

# Lesson 1: Introducing the Brown Bears

4. Explain that for any living thing, some of its traits are inherited and some are acquired through its life stages.
  - **Inherited traits** are the characteristics passed from biological parents to their offspring.
    - Inherited **physical** traits include eye color, ear shape, the hump on the back.
    - Inherited **behavioral** traits include instincts (such as salmon migrating up Brooks River or bears' eating food).
  - **Acquired traits** are the characteristics an individual develops during their life.
    - Acquired **physical** traits include things that happen to someone (such as getting a scar, gaining or losing weight).
    - Acquired **behavioral** traits include things someone learns (how the bears fish for food—diving in the water, catching salmon in the air).

## Identify Inherited and Acquired Traits

1.  Give each student the **Katmai Brown Bear Identification** handout, which describes observable physical and behavioral traits.



Katmai Brown Bear Identification



## Lesson 1: Introducing the Brown Bears


- Have students work in pairs to read aloud and discuss each trait and mark the right-hand column with one of the following:
  - “I” if they think the trait was inherited
  - “A” if they think the trait was acquired
- Once a pair has completed the sheet, have them meet with another pair to compare and discuss their answers. Let them know that the class will review the answers in the next lesson.

### REFLECTION

- Give the class a cloze activity to evaluate their understanding of the difference between acquired and inherited traits. Write on the board:
  - An inherited trait means it is \_\_\_\_\_. An example of an inherited trait is \_\_\_\_\_.
  - An acquired trait means it is \_\_\_\_\_. An example of an acquired trait is \_\_\_\_\_.
- Have students write the sentences and fill them in.
- Read students’ written responses to help you decide how deep a review to give in the next lesson.

### EXTENSIONS

#### Bear Years

- Have students calculate their age in bear years.
  -  Print a copy of the **Katmai Junior Ranger Bear Years** handout for each student and have them fill it in.  
 Or, write this equation on the board:  
 $(\text{student age}) / 4 = \text{Bear Years}$
- Have students decide what bear life stage they would be in:
  - Cubs (younger than 2½ years old): They are still dependent on their mother.
  - Subadults (between 2½ and 6 years old): They stay with their mother, but are not fully dependent.
  - Adults (older than 6 years): They usually don’t reach full size until they are 10–12 years old and live to be about 20 years old.




Katmai Junior Ranger Bear Years





## Lesson 1: Introducing the Brown Bears

### Stream the Live Cam

1.  If online streaming is available in your school (and the month is right), link to one of the live cams hosted by explore.org:
  - [The Falls](#) (most active in July)
  - [The Riffles](#) (most active in September)
  - [The Lower River](#) (most active in September and October)
2. Allow it to play during the class's free time. Alternatively, give the link to students, so they can watch from home.

### Clues to a Bear's Sex

1. Determine which sex characteristics to share with your class.
2. Identify the ways students might distinguish between male and female bears:
  - If it is an adult bear with cubs, it is a female.
  - If it has visible genitalia, it is a male.
  - If a stream of urine goes in back of its hind legs, it is a female.
  - If a stream of urine goes straight down between its hind legs, it is a male.





## Spring Cubs



## Older Cubs



# Subadult








# Adults

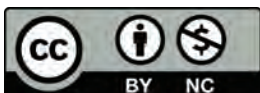


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## Katmai Brown Bear Identification





Trait		Acquired (A) or Inherited (I)?
<b>Body shape and size</b>		
<ul style="list-style-type: none"> <li>All brown bears have a shoulder hump.</li> </ul>		
<ul style="list-style-type: none"> <li>Most bears carry more weight in their shoulder area. Note if one carries more weight in its hind quarters.</li> </ul>		
<ul style="list-style-type: none"> <li>Over the summer, bears can eat enough to gain 1 kilogram (over 2 pounds) in 1 day.</li> </ul>		
<b>Head shape and size</b>		
<ul style="list-style-type: none"> <li>The shape of a bear's muzzle (nose) can be               <ul style="list-style-type: none"> <li>long or short</li> <li>pointed or blunt</li> <li>stepped or straight from the forehead</li> </ul> </li> </ul>	<div style="display: flex; justify-content: space-around;"> <div data-bbox="704 1530 972 1793">  <p data-bbox="704 1801 972 1856">short, blunt, straight from forehead</p> </div> <div data-bbox="997 1530 1265 1793">  <p data-bbox="997 1801 1265 1856">long, pointed, stepped from forehead</p> </div> </div>	

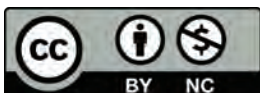


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## Katmai Brown Bear Identification

Trait		Aquired (A) or Inherited (I)?
<ul style="list-style-type: none"> <li>The size of a bear's eyes can be large or small</li> </ul>	 <p>small eyes                      large eyes</p>	
<ul style="list-style-type: none"> <li>A bear's ears can be               <ul style="list-style-type: none"> <li>large or small</li> <li>triangular or oval</li> <li>upright or flopped over</li> </ul> </li> </ul>	 <p>large, triangular, upright eyes      small, oval, upright ears      flopped over eart</p>	
<ul style="list-style-type: none"> <li>Note if a bear is missing all or part of an ear.</li> </ul>		
Fur color		
<ul style="list-style-type: none"> <li>A bear's fur can be               <ul style="list-style-type: none"> <li>Light or dark</li> <li>Short or shaggy</li> </ul> </li> </ul>		



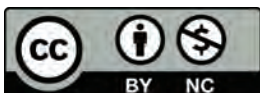


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## Katmai Brown Bear Identification

Trait		Aquired (A) or Inherited (I)?
<p><b>Scars and wounds</b></p> <ul style="list-style-type: none"> <li>Scars or wounds are most visible when adult bears shed in the early summer. They are usually seen               <ul style="list-style-type: none"> <li>On the face and neck</li> <li>On the back</li> <li>On the sides</li> </ul> </li> </ul>		
<p><b>Claw color</b></p> <ul style="list-style-type: none"> <li>Most bears have dark claws. Note if one has tan-tipped or white claws.</li> </ul>		
<p><b>Fishing techniques</b></p> <ul style="list-style-type: none"> <li>Note how a bear tries to catch salmon, and whether it does               <ul style="list-style-type: none"> <li>With its mouth</li> <li>With its claws</li> <li>While sitting</li> <li>While standing</li> <li>While underwater</li> </ul> </li> </ul>		



# 1



## Katmai Junior Ranger Bear Years

### Bear Years

A life span of a Katmai bear averages 20 years. People in the United States usually live to be around 80 years old. Bears, just like us, go through many amazing changes as they mature. In this activity, read about the different life stages of brown bears. Then, find your bear age and life stage.

#### Subadult

These are bears between 2.5 and 6 years old. They no longer stay with their mother, but aren't fully mature. Subadult bears face a lot of competition from older, larger bears.

#### Adult

These are bears older than 6 years. They are the biggest of all bears, but they usually don't reach their full size until they are 10-12 years old.

#### Cubs

Cubs are young bears dependent on their mother. They are usually younger than 2.5 years old. When cubs are born, they weigh less than one pound, are blind, and are completely hairless and toothless.

### Calculate Your Bear Age

$(\text{Your Age}) \div 4 = \text{Bear Years}$

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Are you a cub, subadult, or adult?

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<https://www.nps.gov/katm/learn/upload/Katmai-Junior-Ranger.pdf>

