



WILD

WONDERS



FUR, FLUFF, AND OTHER STUFF!

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In This Issue

Mammals living in Alaska have special adaptations to survive the winter. How do they do it? We can learn a lot by focusing on one of their helpful adaptations: FUR!

Fur teaching guides and kits are available from local ADF&G offices for teachers to borrow.

Learn more online at:
go.usa.gov/xUKzZ

Can you match each of us to the letter of "Wild Wonders" with the correct fur? Find clues inside, and answers are on the back!



Do you know which animals are **FURRY**?

Mammals!! From sea to summit, Alaska is home to many mammals.

A mammal is a warm-blooded animal with a backbone – called a vertebrate – that has hair or fur and can produce milk to feed young.

Mammals in Alaska have adapted to many different habitats.



Aquatic animals live mostly in water

Sea Otter (*Enhydra lutris*)

Sea otters have the thickest coat of any animal, with one million hairs per square inch of skin. They spend their whole lives at sea and are the only marine mammal that does not have a layer of blubber to insulate against the cold ocean water.



Semi-aquatic animals live both on land and in water

Beaver (*Castor canadensis*)

Beavers are the largest rodent in North America. They live in and around freshwater environments, and they produce a special oil that helps to keep their fur water resistant and skin dry, even while underwater!



Terrestrial animals live on land

Muskox (*Ovibos moschatus*)

Muskox underfur is the source of the world's warmest natural fiber. Their fur is eight times warmer than wool! Each spring muskoxen shed their fur, which is then collected by people to make a fine fiber called qiviut.

What other mammals can you think of?
What habitat(s) do they live in?



American black bear (*Ursus americanus*)

Check out our list of Alaska mammals by searching "mammals" on our website: www.adfg.alaska.gov

What is **FUR**, anyway?

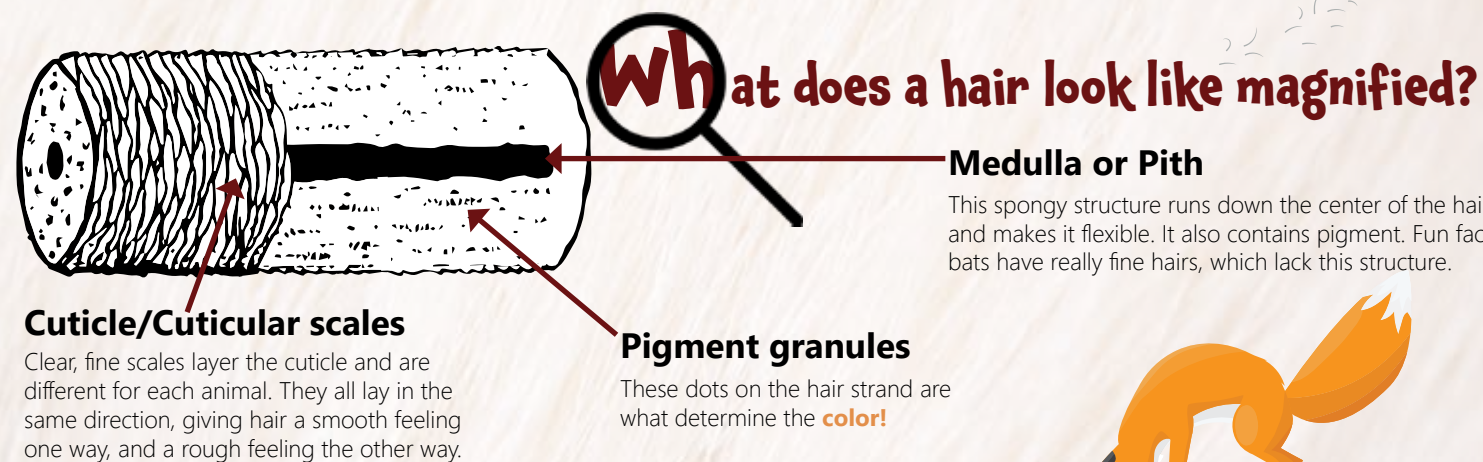
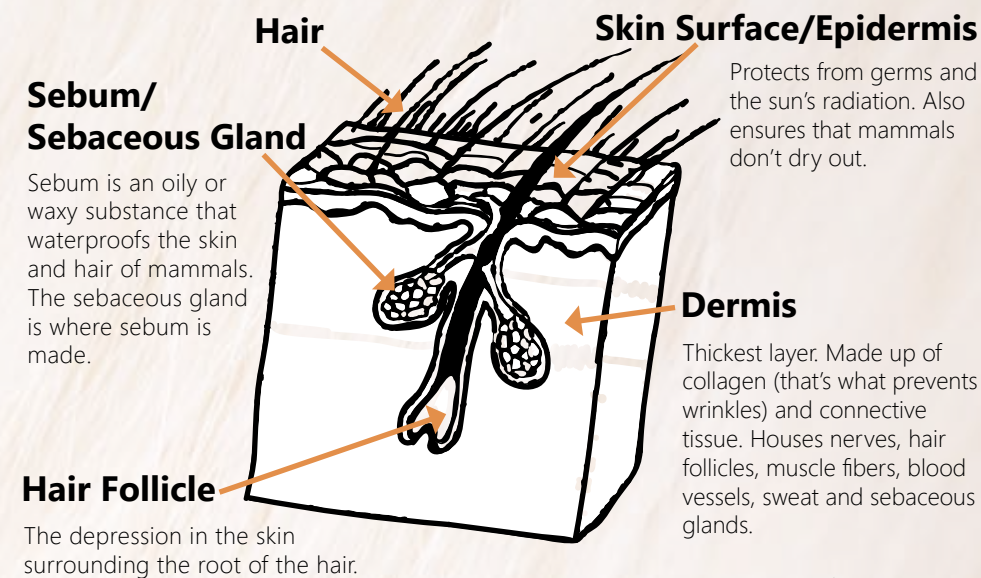
A closer look at fur...

Did you know we have fur, too? It just doesn't cover our entire body. That's why we call it "hair", instead!

Hair grows slender and thread-like from the skin of mammals, and is made mostly of protein.

The word **fur** describes the hair on non-human animals when it covers the entire body. The word **pelage** refers to the full coat, or all the hair or fur on an animal body.

A closer look at the structure of the skin reveals the important layers of a mammal's outermost barrier.

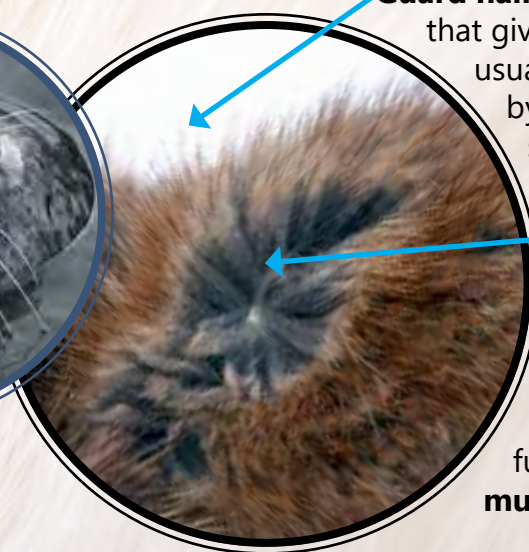


Red fox (*Vulpes vulpes*)

What are the different kinds of fur?

Tactile hairs are modified hairs that can act as sensors for mammals. These hairs are especially sensitive to pressure changes in their environment.

Whiskers are one kind of tactile hair. Seals use whiskers to sense movements in the water, which helps them detect prey swimming by. More on page 6!



Guard hairs are longer, coarse hairs that give an animal color. They usually protect the underfur by shedding water and shielding it from abrasion.

Underfur is shorter, finer and denser than guard hairs, and is responsible for almost all the insulation and warmth that mammals get from fur. This fur is from a **muskrat** (*Ondatra zibethicus*).

FUR, FLUFF and OTHER STUFF helps mammals Survive and Thrive!

Insulation

Fur is insulating, which means mammals use it to reduce the amount of body heat they lose to their colder surroundings. The fur of some Arctic mammals can insulate so well that their core body temperature is 180° Fahrenheit warmer than their environment. That's like trying to keep a pot of water boiling while it is sitting on snow! Animals generate warmth by turning energy they gain from the food they eat into heat. Air pockets trap the heat within dense fur – such as the coat of this **mountain goat** (*Oreamnos americanus*) – and help mammals minimize how much heat they lose.

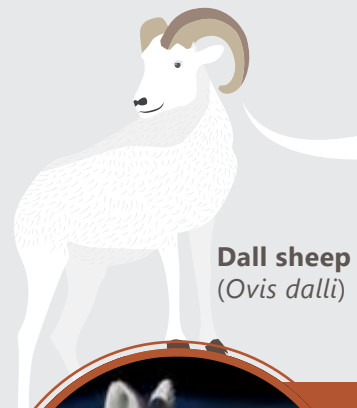


Color and insulation

White fur can insulate better than dark fur, as it is hollow and can trap more air than hair with pigment. More trapped air means greater warmth, just like when you wear a down jacket!

Tools for Science: Infrared!

Infrared photography is sensitive to heat rather than light – red, orange, and yellow areas show warmth or areas of high heat loss, and purple to blue indicates cold areas that are losing little heat. **Polar bears** (*Ursus maritimus*) are so well insulated by inches of blubber and fur that the heat they produce is almost invisible in infrared images! Where do you think this bear is losing the most heat, based on this infrared photo?



Dall sheep
(*Ovis dalli*)

Many mammals can physically raise their hairs to create even more insulating air space, and surround themselves with extra warmth. Did you know that this is also what you do when you get “goose bumps”!



Camouflage

Snowshoe Hare (*Lepus americanus*)

Snowshoe hares change their fur throughout the year to match the color of their surroundings. This adaptation helps them **camouflage** to avoid predators. White fur is also warmer than dark fur in the winter!

Movement

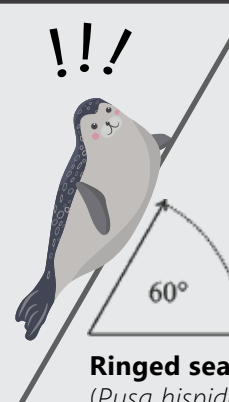
Harbor Seal (*Phoca vitulina*)

“Hair” seals do not have underfur because they use blubber for insulation. They use their short, stiff and sleek guard hairs to glide through the water.

However, they also use these hairs to get a grip. Seals can climb a 60° incline even on wet, slippery ice!



MMPA permit #358-1787

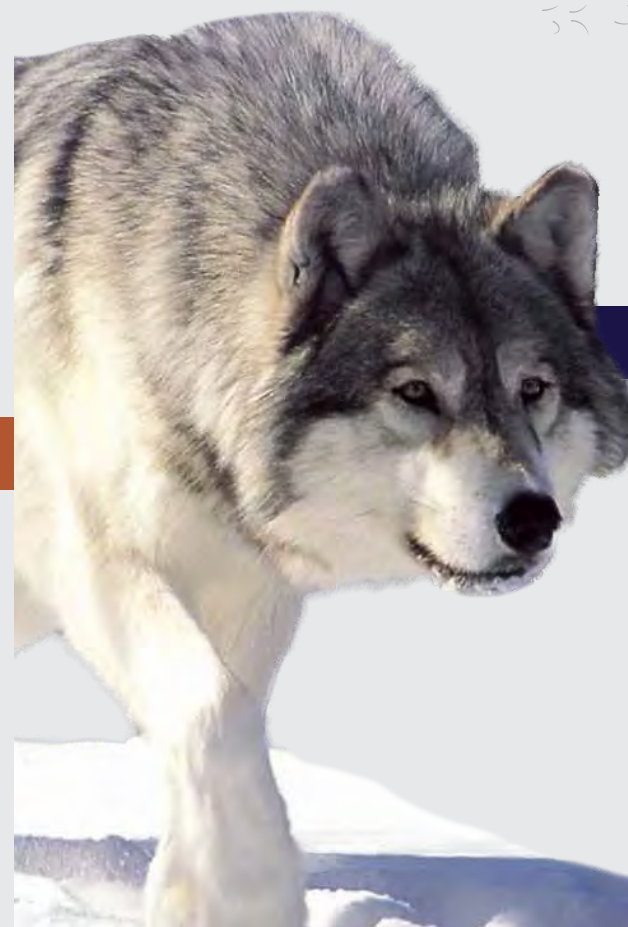


Ringed seal
(*Pusa hispida*)

Defense

North American Porcupine (*Erethizon dorsatum*)

When threatened, a porcupine can use **quills** as a defense against predators. Porcupine quills are stiff, extra-large, hollow tactile hairs. Once stuck in the nose of a wolf, or any other predator, their barbed ends make them difficult to remove.



What do you think this wolf is trying to communicate with fur?

Can you think of any ways that humans communicate without using their voice?

Communication

Gray Wolf (*Canis lupus*)

Can you imagine communicating with your hair? Wolves can! By raising or flattening their fur, a wolf can signal aggression, defensiveness, or dominance.



American bison
(*Bison bison*)

What can we learn from fur, fluff and other stuff?

Whiskers!

Fur seal species grow **whiskers** for up to 10 years! Whiskers are like a history book about the life of the animals that grow them, such as **northern fur seals** (*Callorinus ursinus*). Whiskers can show patterns in diet and stress, and can even tell us how many times an animal has given birth, which can give scientists critical information about their populations.

Whiskers consist mostly of protein, but other molecules are deposited along the whisker as it grows. Hormones are molecules that carry signals through the bloodstream. Peaks in hormones can tell us that an animal is responding to a specific signal.



Spikes in a hormone called progesterone can indicate that a female seal was pregnant. Each dot represents a measurement of progesterone along the whisker.

Circle all the times you think this female seal had a pup. The most recent one is done for you as an example.



Grizzly fur "fingerprints"



In the Arctic region of Alaska, biologists have constructed a region-wide family tree for **Grizzly bears** (*Ursus arctos*) using fur! Simple wire **snare**s have been placed across the landscape, and provide a place for bears to scratch an itch. When they rub against the wire, they often leave some fur behind. Fur contains DNA, just like human hair. Scientists can identify individual bears from the DNA in a fur sample! This allows them to estimate how many bears there are in an area (see issue 2017), and if bears are related. Scientists can also use this data to study the ecology of North Slope bears: what fur "fingerprinted" bears eat, how far young bears move from their parents, and the behavior and interactions of family clans of related bears.



What would your hair tell us about you?!

How are people connected to fur?

Animal furs and skins have been important to people for as long as humans have existed. Before the development of non-natural fabrics, fur was one of the only natural materials that provided protection and insulation from the elements, especially during the cold, windy or damp Alaskan winter.

In modern Alaska, trapping remains important for many reasons, including for food and clothing. Furs also brings a cash income to rural areas, and additional income for trappers living in larger communities. Wearing fur isn't for everyone, but in Alaska, it remains a common way for many people to keep warm. This ruff was made from **gray wolf** fur!



Which animals are trapped for fur?

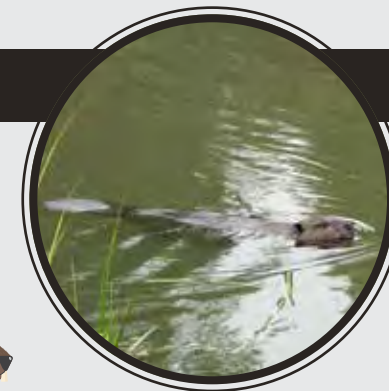
Animals that people are interested in trapping for their furs are referred to as **furbearers**. Twenty different species can be trapped in Alaska. The most sought after animals are: marten, red fox, wolf, wolverine, beaver, lynx, coyote, river otter, mink, muskrat, ermine, red squirrel, and arctic fox. Photo: **American marten** (*Martes americana*).



Prime Time

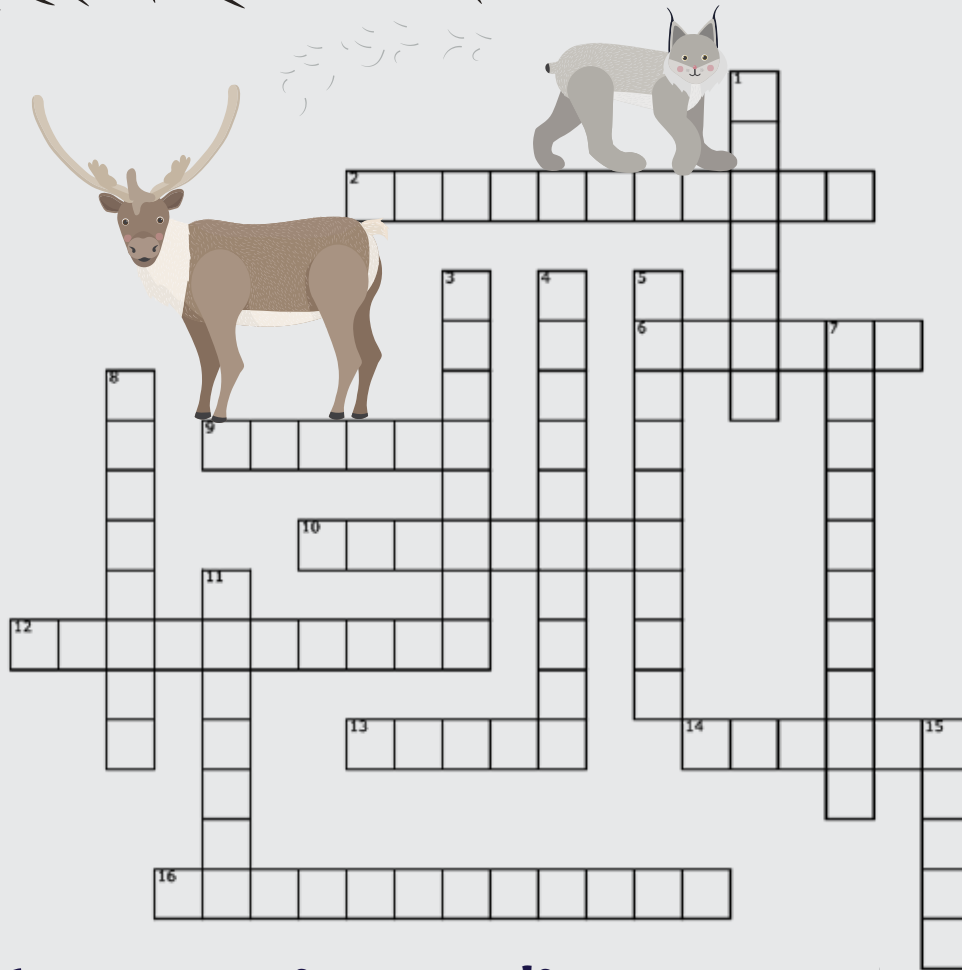
People are not allowed to trap animals any time they want. To ensure the highest quality and value of the animal fur, regulations are set to allow trapping when the fur is in its best condition. **Prime fur** has reached its longest length, highest density, and finest texture. In general, most animals are in prime condition during the winter months, and that is generally when trapping is allowed. Photo: **North American river otter** (*Lutra canadensis*).

Making fur garments is a process...



Do you have any items made from fur at home?

FUR Crosswords SAKE!



Across

2. _____ animals live partially on land, and partially in water.
6. Another name for all of the hair on a mammal, or the complete coat.
9. Modified hairs that porcupines use as a defense from predators.
10. Short, course hairs responsible for almost all insulation and warmth mammals get from fur.
12. Animals that people are interested in trapping for their fur.
13. Fur that has reached the maximum length, density, and finest texture.
14. Simple wire _____ were used to collect fur samples from grizzly bears in Arctic Alaska.
16. The depression in the skin surrounding the root of a hair.

Down

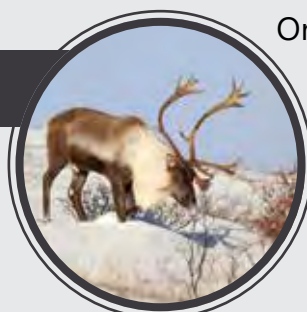
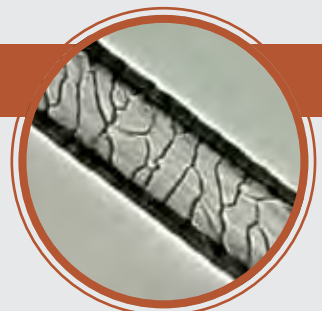
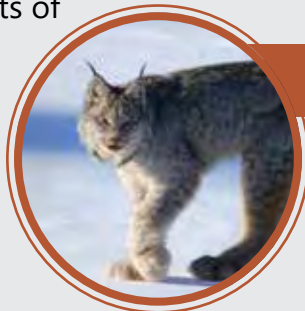
1. The outer layer of a hair, that is also covered in layered, clear scales.
3. Tactile hairs that help seals sense movements in the water.
4. The adaptation that allows mammal fur to match it's surroundings to help it blend in.
5. The outermost layer of mammal skin that protects deeper layers from germs and sun radiation.
7. Long, course hairs that give mammal coats color and protect the underfur.
8. This type of photography is sensitive to heat, rather than light (hint: polar bear!).
11. The spongy structure running down the center of a hair that makes it flexible.
15. An oily or waxy substance that waterproofs mammal hair and skin.

Answers on page 6 and 7

Want to see for yourself?

The Alaska Fur ID project: www.alaskafurid.wordpress.com, has many examples of wildlife fur from the Alaska State Museum under a polarized light microscope, as well as lots of other informative material.

Find out what happens if **Canadian lynx** (*Lynx canadensis*) fur has medulla that are spread out in some places and really close together in others. Does that mean the fur is weaker in some spots? What do you think?



Or, examine what **Caribou** (*Rangifer tarandus*) hairs look like up close. Did you know that even caribou noses have fur? What colors do caribou have in their fur? In which seasons?

Log on and check it out!