Lesson Title:	"Close Encounters:" Using Ethology to Study Sled Dogs and Other Animals
Background Information	
Created By:	Kate Newmyer, Seabrook, TX
Grade Level/ Subject:	K-12 Biology
Learning Objectives/ Essential Questions:	• What is ethology? • How was ethology developed? • How do mushers use ethology to study, train, and race sled dogs? • How can we use the mushers' examples to study animals close to us, including pets and wildlife? • Why is it important to study animal behavior through ethology?
Standards Addressed	Texas Essential Knowledge and Skills (TEKS): Biology (1) Scientific processes. The student conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to: (A) demonstrate safe practices during laboratory and field investigations (2) Scientific processes. The student uses scientific practices and equipment during laboratory and field investigations. The student is expected to: (A) know the definition of science and understand that it has limitations (D) distinguish between scientific hypotheses and scientific theories (E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology; (F) collect and organize qualitative and quantitative data (G) analyze, evaluate, make inferences, and predict trends from data (H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports. (3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. (7) Science concepts. The student knows evolutionary theory is a scientific explanation for the unity and diversity of life. (C) compare characteristics of taxonomic groups, including archaea, bacteria, protists, fungi, plants, and animals. (11) Science concepts. The student knows that biological systems work to achieve and maintain balance. (B) describe how events and processes that occur during ecological succession can change populations and species diversity. (12) Science concepts. The student knows that interdependence and interactions occur within an environmental system. (A) interpret relationships, including predation, parasitism, commensalism, mutualism, and competition, among organisms. (B) compare variations and adaptations of organisms in different ecosystems (E) describe how environmental change can impact ecosystem stability.

Materials Needed:	1. Recording sheet or ethogram—included, or have students create their own. 2. Animals to observe. These can be pets, insects, working animals, animals from a nature center or other facility, or use sled dog videos or other videos. 3. Iditarod sled dog information: You and Your Dog! – Iditarod Healthy Happy Dogs – Look, Listen & Feel – Iditarod Sled Dog Videos: Training a Puppy to be a Big Sled Dog! (youtube.com) Iditarod Sled Dogs: Facts To Know (youtube.com) Meet Our New Sled Dog Puppies (youtube.com) My Journey: Dallas Seavey's Quest for a Historic 6th Iditarod Win - YouTube 2013 Iditarod runner-up Aliy Zirkle loves her dogs' dedication, enthusiasm - YouTube Aliy Zirkle's dogs howling at the Takotna Checkpoint (youtube.com) Sled Dogs: More Than Meets the Eye | National Geographic (youtube.com) Animal Videos: Videos – Mouse Ethogram (mousebehavior.org) This web site shows the breakdown of the ethology behavior categories. They give examples of different types of behavior in mice. Webcams - The Houston Zoo Live Cameras | San Diego Zoo EarthCam - Animal Cams Many zoos have live animal cams—maybe your local zoo does. My videos: Robin eating a moth Ferret playing Birds diving for fish Kitten making biscuits My dog Gus wagging his tail Travis Beals dogs leaving on a training run Iditarod dogs ready to race
Procedure	
Engagement:	Ask about different kinds of animals students have watched doing different things. Answers may vary, and could include, pet dogs, cats, or exotic pets, animals at a zoo, wildlife center, or exotic animal facility, or livestock. Have a discussion about the physical features of the animals, such as paws, skin texture, eye placement, etc., and ask if students know the reason the animals have these adaptations. Then ask, what interesting behaviors did the students observe? As the students name the behaviors, ask if the students know why the animal exhibits these behaviors. Model investigating why an animal exhibits a certain behavior using reputable sources, such as, why do wolves howl? Show the video of Aliy Zirkle's dogs howling at the Takotna checkpoint. Ask students, what behavior do you observe? What do you think the dogs were doing right before? What are the environmental factors?

	As fits the grade level of your students, explain that ethology is a branch of biology where scientists specifically study animal behaviors. Ethologists want to know if animal behaviors are typical in a natural habitat, change with seasons or times of year. They are also looking for changes in behavior that could mean illness or being ready for mating. Scientists also observe how an animal uses its adaptations in the behavior that it exhibits. Explain that ethology began when Charles Darwin published a book called *The Expression of Emotions in Man and Animals*. Darwin's ideas captured the attention of three biologists: Nikolaas Tinbergan, who was Dutch, and Konrad Lorenz and Karl von Frisch from Austria. Their work in the 1930s earned them the 1973 Nobel Prize in Medicine. The word ethology derives from Greek: ethos meaning character, and -ology, or "the study of." Jane Goodall is a well-known ethologist who studied chimpanzees. Students may also be familiar with David Attenborough and Steve Irwin, who helped millions of people understand animal behavior. There are many reasons to study animal behavior. First, humans have always studied animal behavior for the very practical reason of aiding in hunting. Another important reason to study animal behavior is to help keep us safe. We can keep from being injured or becoming prey. A third reason is that animals are often partners alongside humans in doing work. Sled dogs are considered partner animals with humans in pulling freight or racing. Lastly, animal behavior is fascinating and interesting. We humans might notice similar patterns among ourselves or across animal species, and of course, we may live with animals that we observe every day. Mushers are ethologists because they observe and evaluate sled dog behavior in order to train and work side by side with then. <u>A note on safety and ethics</u>: In order to keep the animals and yourself safe, students should only observe the animal in its normal environments. It is unkind and unethical to tease or provoke an animal into exhibiting certain behavior. Follow the rules and protocols at the facility where you are observing—for example, taking your dog to a dog park or pet supply store. Be sure not to harm insects and other animals you observe in your neighborhood. It is ok to offer appropriate enrichment to animals and observe how the behavior changes—for example, offering a cat catnip, or placing an appropriate type of enrichment food in the enclosure. If students have any questions, they should ask an adult.
Lesson:	1. Teach ethology vocabulary. Do what works for your students. For example: For HS students: teach the vocabulary list with examples. For students in grades 4-8: teach the highlighted vocabulary. For students in grades K-3: teach word and concepts that fit the needs of your students. 2. Teach that there are three main categories of behavior: Inactive, Maintenance, and General. Inactive refers to having little to no movement. Sleeping is considered inactive, but also staying still and alert. Maintenance behavior includes eating, drinking, grooming, and nesting, or things the animal does to take care of itself. General behavior is considered to be active behavior that includes exploring, playing,

	mating, maternal behavior, as well as friendly and unfriendly behavior toward others of the same or different species. 3. Share the linked videos that have to do with mushers observing and talking about their dogs. Have students notice what behaviors the dogs are exhibiting. A good one to start with is Sled Dog Facts to Know. Complete an ethogram for the sled dog behaviors observed in the video together as a class. 4. Have students work in partners or individually as fits the needs of your class. For the second observation sheet (geared to upper elementary and intermediate), consider having students use their own timer to record the length of observation and work in partners. Students should observe silently so the animals exhibit as much natural behavior as possible. 5. Have students design an ethogram specific to an animal they want to study. Students can use the recording sheets I've included or create their own, depending on the species and types of behavior they are observing—for examples, ferrets are more likely to play, while snakes might explore more when they are out of their enclosure than when they are in it, and dogs tend to exhibit more social behavior. 6. Independent work. Younger students can observe a family pet across a series of days and in different environments or situations such as feeding, resting, playtime, walks or other enrichment. Older students might observe an animal visitor to your class, visit a nature center, use local wildlife or family livestock, or set up an observation schedule for the web cams listed in this lesson plan or other ones local to you. Alternatively, students could decide to observe specific behavior across different kinds of species. For example, when do sled dogs bark, compared to when their dog barks? Is sleeping and other inactive behavior the same or different among rodents, mammals, and/or birds? Intermediate and HS students can design an ethology observation experiment using available animals such as family pets, backyard species, or working animals. Students can also study a variety of sled dog images and videos from across the internet or from the Iditarod web site and collect data on the behavior observed. Students should develop a hypothesis about the type of behavior they think they will observe. Then collect data and determine if they were correct. Then evaluate results and ask further questions. Tips for success: Choose a period of days to observe the animal. Choose different times of day or night to observe the animal or set up a camera to take videos at night or during the day while you are gone if you have one available. If using the animal cams, be sure to check the cameras at different times of the day and night.

	Students can also choose a type of behavior to observe in different species. For example, students can compare nesting behavior in sled dogs, pet dogs, cats, and rodents. List the photos, videos, live camera feeds, or actual animals you are using to study this behavior. Students can also ask, how do sled dog handlers and mushers use a dog's innate behavior to create learned behavior? Look for sled dog training videos and note the behavior observed. Students can research the animal's behavior or ask an expert. Remind students that they are observing, not judging or interpreting. Once they have an ethogram or log of behavior, then they can note behavior at different times of day or compare different species.
Assessment:	1. Have students complete an ethogram at home and then share results with the class, or compile data according to species observed—cats, dogs, hamsters, horses, chickens, etc. Students can create conclusion statements about their data. 2. Give students an opportunity to share their ethogram as a presentation that includes each part of the scientific method.
Notes:	
Enrichment/ Reinforcement Suggestions:	1. One idea I found is this Zoo Animal Webcam Bingo Cards (si.edu) set from the National Zoo in Washington, D.C. Using these bingo cards as inspiration, students can design a set of bingo cards for their class to use when observing sled dog videos and or while animal cams are being shown in the classroom. 2. Ask an animal biologist or veterinarian to visit your class and talk about the behaviors of the animals they study. Veterinarians can specifically talk about dog behavior. If you know a vet with sled dog experience, ask them to visit your class virtually or in person.
Other:	Thank you so much to Ande Smith, Director of the Living Materials Center at Clear Creek ISD, for inspiring this lesson plan. Be sure to check out the LMC photo gallery!

My Animal Observation

Animal: Date and Time:




Circle where the animal is: in its enclosure, in a small, fenced area inside a building, outside, or being held.
Below, add a tick mark each time you see the animal playing, eating, drinking, or sleeping.
At the bottom, draw a picture of other behavior you see.

			

Animal Observation Ethogram Date:

Animal: Start and end time of observation:

Animal description and adaptations, including natural habitat:

Environmental factors: describe the environment of the animal. Include structure, enclosure, area, available enrichment or bedding area, food and water present, presence/absence of other animals or people.

Add a tick mark for each behavior observed during the observation period.

Inactive Behavior	General Behavior	Maintenance Behavior
Sleeping	Eating	Exploring
Resting and Alert	Drinking	Friendly Interaction
	Grooming	Unfriendly Interaction
	Nesting	Other

1. What was the most common behavior observed?

2. List unusual behaviors you saw.

3. Research or ask an expert why the animal exhibited a certain kind of behavior. Explain below.

4. Which behaviors do you think are innate, and which are learned behavior? Explain below.

Ethology Vocabulary

Animal Behavior	The ways in which animals interact with each other, with members of other species, and with the environment.
Adaptation	A physical or behavioral feature of an animal that helps them better survive in their environment. In other words, an adaptation is something on their body or something they do with their bodies that help them find food, water, mates, and shelter.
Bricolage	The solving of practical problems using whatever materials happen to be at hand.
Innate behavior	behavior that's genetically hardwired in an organism and can be performed in response to a cue without prior experience. (*Innate* is the term used rather than *instinct*.)
Learned behavior	A behavior that an organism develops as a result of experience. Sled dogs knowing how to pull together is an example of learned behavior.
Environmental factors	A factor, abiotic or biotic, that influences living organisms.
Abiotic factors	Abiotic factors include ambient temperature, amount of sunlight, air, soil, water and pH of the water soil in which an organism lives.
Biotic factors	the living components (organisms) that shape up the environment. This could include plants, other species other animals of the same species, or humans.
Fixed action patterns	a predictable series of actions triggered by a cue, sometimes called the key stimulus. Though a fixed action pattern is more complex than a reflex, it's still automatic and involuntary. Once triggered, it will go on to completion, even if the key stimulus is removed in the meantime.
Habituation	the relatively permanent waning of a response as a result of repeated stimulation, is a form of behavioral flexibility that allows animals to filter out irrelevant stimuli and to focus selectively on important stimuli.
Associative learning	Associative learning is defined as learning about the relationship between two separate stimuli. For example, giving a sled puppy a treat when it sits associates the sitting behavior with a positive reward.
Imprinting	a type of innate learning in animals immediately after birth or hatching to recognize their caregiver for food and protection.
Inactive Behavior	Exhibited behavior with little to no movement. Sleeping is considered inactive, but also staying still and alert.
General Behavior	General behavior is considered to be active behavior that includes exploring, playing, mating, maternal behavior, as well as friendly and unfriendly behavior toward others of the same or different species.
Maintenance Behavior	Maintenance behavior includes eating, drinking, grooming, and nesting, or things the animal does to take care of itself.
Affiliative Interactions	Friendly behavior, can be one animal to another or both to each other.
Agonistic Interactions	Unfriendly behavior, can be one animal to another or both to each other.
Maternal Behavior	the collection of behaviors by the mother that can increase offspring survival, such as protecting, nursing, and cleaning.