ANALYZING TRAIL CAMERA IMAGES

Analyzing Images

Terms to Know Related to Capturing Images

Fire	When the camera takes a picture it "fires"
Misfire	When the game cam does not take pictures appropriately
Failure	The camera fails to work completely due to lack of batteries or SD card failure
Detection (or Capture)	The game camera captures an image of an organism
Non-game Detection (NGD)	The camera takes a picture of non-game or study species or events, such as people walking by, cars, vegetation movement
Unidentified species (USP)	When an organism is captured in an image or video but cannot be identified
Miss	The camera takes a picture or video and there is nothing seen in the shot
Session	A period of time over which the camera is run; may also be stated as "days of operation"
Temporally independent detection (TID)	Captures of animals separated by an half hour or more

Exercise: Have students create flash cards of the terms listed below, or put them on the board and see if they can help you figure out what each is.

***It is highly advised that you don't allow students to look at the SD cards without previewing them*.** There have been recorded instances of lewd behavior, flashing, and inappropriate content recorded on cams. Be sure to pre-screen cards before students have access to the images. There is a very slim chance that you may see something illegal such as poaching. If this is the case then please contact the police or your local Fish and Wildlife Department immediately.

RULE #1: Never delete any photos (unless they are inappropriate). Even though it's tempting to delete photos, you may be missing large chunks of data. You need to look carefully at every photo, and count those that are considered "misses" or "non-game detections." Always record misfires, camera failures, and missed captures.

RULE #2: The lack of evidence of a species does not mean that there is no evidence of that species.

RULE #3: Standardize and set your parameters for what you will and won't count for images. For example, do you count an animal if you think you see it in the picture but it's unclear? Do you count it if you see only its ear tip? Do you want behaviors or just presence/absence? Etc.

RULE #4: Standardize how you count discrete individuals. For example, if a deer is captured 3 x over a 20 minute period then you know it's probably the same one. One way to standardize is to set the limit at 30 minutes or 1 hour per capture of a specific species of animals before you count another unique individual.

OBSERVATIONS V. INFERENCES WHEN ANALYZING IMAGES

A key component of picture analysis is understanding the difference between observations and inferences. This is a great chance for students to assess how they explain the images and their findings. Explaining the difference can also be a tool for the Next Generation Science Standards of creating arguments from evidence. Here's a quick primer:

Observation is gathering information using your senses, such as sight, smell, sound, hearing, touching and tasting. These observations are directly observed or experienced. Using game cameras and analyzing the images is considered a form of observation, though through indirect observation.

There are Two Types of Observation

Qualitative Observation

- Qualitative observations **DESCRIBE** what is being observed
- The word "Qualitative" has the term "Quality" in it, which is descriptive
- Qualitative observations use ADJECTIVES to describe something.
- Example: "The deer was running quickly past the camera" or "The otter was vigorously grooming."

Quantitative Observation

- Quantitative observations MEASURE what is being observed
- The word "Quantitative" has the term "Quantity" or number/numeral in it, which is a count or measure
- These observations always use numbers to measure something
- Example: "There were three raccoons in the photo" or "There was only one male turkey in the frame of the photo."

Exercise: Have students look at the image below and describe quantitative and qualitative observations. After they learn about inferences then they can also list inferences.

Comparison of Qualitative data v. Quantitative Data in the picture provided:

QUALITATIVE DATA	QUANTITATIVE DATA
● The picture is during the day ● The deer are running and one is standing ● One deer is a buck, you can see the antlers ● A white car is driving by ● The field is brown and only a little green. ● Some of the deer look blurry in the picture ● The deer's tails are white and raised	● There are six deer in the photo ● One deer appears to be a buck, and the rest does, though one is out of the frame ● Four of the deer appear blurry ● There is one car driving by ● The time this photo was taken was 17:36 am ● The temperature was 57 degrees when this was taken ● The date this was taken was February 2nd, 2018

Inferences are explanations for what you are observing. They explain what is going on based on your knowledge or past experiences and your present knowledge. Inferences can be changed when a new observation is made, or when new information becomes available.

Inferences from the picture:

- There is a road in this picture because a car is driving by
- The deer are running because they have been startled by the car going by
- The deer have their tails raised because they are frightened and giving an alarm
- This photo was taken in the winter, and it appears that the farmer's field is fallow because the grass is short and there are crumpled corn stalks.

There are two distinct types of data that you can collect, observations and inferences.

QUALITATIVE OBSERVATIONS	
Conditions Observed	Physical conditions present when an animal is detected (can be qualitative or quantitative)
Interaction	Interaction of target species with the camera, other species, or environment (can be qualitative or quantitative)
Health of Animal	How an animal looks, it's overall physical condition
Identification of Individuals	Identification and description of individual animals based on physical markings
QUANTITATIVE OBSERVATIONS (CALCULATIONS)	
Direction	Direction in which an animal is heading
Activity pattern	Patterns of behavior observed in target or other species (can also be calculated as % of animal photos collected in each hour of a 24-hr cycle)
Behavior	How an animal is acting (feeding/grazing, sniffing, defecating, marking, passing through, running, walking, etc.)
Occurrence	Presence or absence of a species (detection or non-detection), or occurrence of specific individuals
Temporally independent detections (TID)	Captures of animals separated by an half hour or more

Occurrence of target Species	Species you're looking for
Species List	List all the species you find
Population	Number of animals present in your target community
Frequency	The number of independent detections in a given period of time
Density	The number of animals present in a given area
Richness	The number of species present in your community
Composition	The make-up of the community described by the relative abundance of each species present (see relative abundance below)
Structure	Description of one or more aspects of a given population, such as age or sex
Relative Abundance (RA)	The number of independent detects of a species divided by the number of camera days. A species' RA can be compared to the RA for other species or for all species in order to determine the composition of your community
Median number of images per camera	The middle number of images taken among all the cameras used. For example if five cameras take 5,10, 15, 20, and 30 images respectively, the medium is 15
Number of successful captures v. unsuccessful captures and non-game species captures	Comparison of the number of images/videos that successfully capture the target species to the number of images/videos that do not capture the target species
Detection Probability	The likelihood of detecting the target species, when it is present, using a particular method
INFERRED BEHAVIOR	
Inferred presence	Inference that an animal is present based on an incomplete image, or an image showing only part of an animal
Inferred behavior	The behavior of an animal may be inferred from conditions surrounding it, or events on the image (photo or video)

IDENTIFYING YOUR SPECIES

If you're not familiar with local flora and fauna you will want to purchase field guides to the species of your region. At a minimum you should get a field guide to mammals, and possibly birds, and reptiles and amphibians. Most of these can be found online or in your local library.

Things to Look For In Images

There are some key things you can look for in images to help you figure out what animal you're looking at and what they are doing, here are a few examples:

- **Eye Shine-** animals have a reflective layer in the back of their eyes. Here are the reflective eye colors of different animals, colors can vary by species or angle of light:
    - **Rabbits-**red
    - **Cats-** yellow
    - **Deer-**yellowish or white
    - **Raccoons-** yellow
    - **Dogs-** varies, usually yellow/green
    - **Foxes-**yellowish orange to yellow
    - **Opossums-** yellow or green
    - **Rat-** yellowish to white
    - **Flying squirrel**-yellowish
- Shapes that look curved, soft, or different from their surroundings
- Blurs of motion
- Shapes of limbs and tail
- Shape of snout or ears
- Shapes of body, look for elongated, rounded, hunched, thick body, thin body, tapered waste or thick neck

- Sexual identifiers such as antlers or feather colors
- Behavior that is unique to a specific species, such as beavers carrying logs in water or reptiles and amphibians basking on logs or even squirrels climbing trees
- Animals interacting
- Animals rubbing or defecating

Citizen Science Projects

Citizen Scientists refers to those that participate in scientific studies but they are not paid for their assistance, or are they necessarily scientists. Typically, they do not analyze data or write papers but are used to help gather data. There are quite a few citizen science project you can participate in, some are listed below:

- Smithsonian e-Mammal: https://emammal.si.edu/
- iSeemammals: https://iseemammals.org/about
- Conservation Northwest: https://www.conservationnw.org/our-work/wildlife/wildlife-monitoring/
- Wild Utah Project: https://www.wildutahproject.org/mammal-camera-trapping-study
- North Carolina Candid Critters: https://www.nccandidcritters.org/about-the-project/
- Snapshot Wisconsin: https://news.cals.wisc.edu/2017/08/10/candid-camera-a-trail-camera-project-called-snapshot-wisconsin-engages-state-residents-in-citizen-science/

EXAMPLE IMAGES

White tailed deer

Two jake or male turkeys.

Raccoon

River Otter

Ruby throated humming bird, male.

Common House Cat (above), Cotton tailed rabbit (below)

Male
Deer

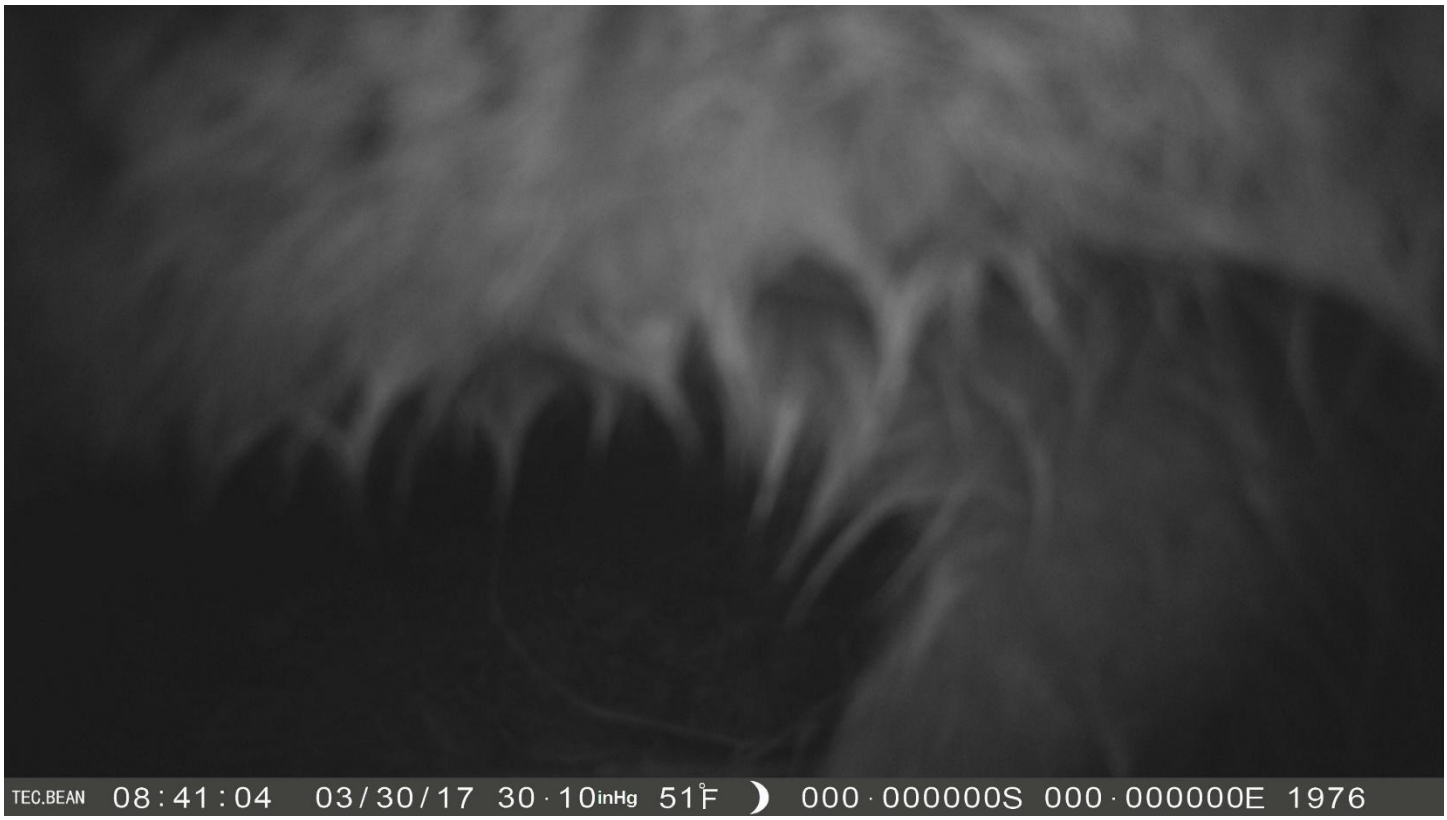
CHALLENGING EXAMPLE PHOTOS FOR STUDENTS TO ANALYZE

Red fox walking by camera trap, with back to camera. Look for black tipped ear and bushy tail, no rings around tail like raccoon. Inferred behavior is scenting, head is down and ears forward, walking away from camera.

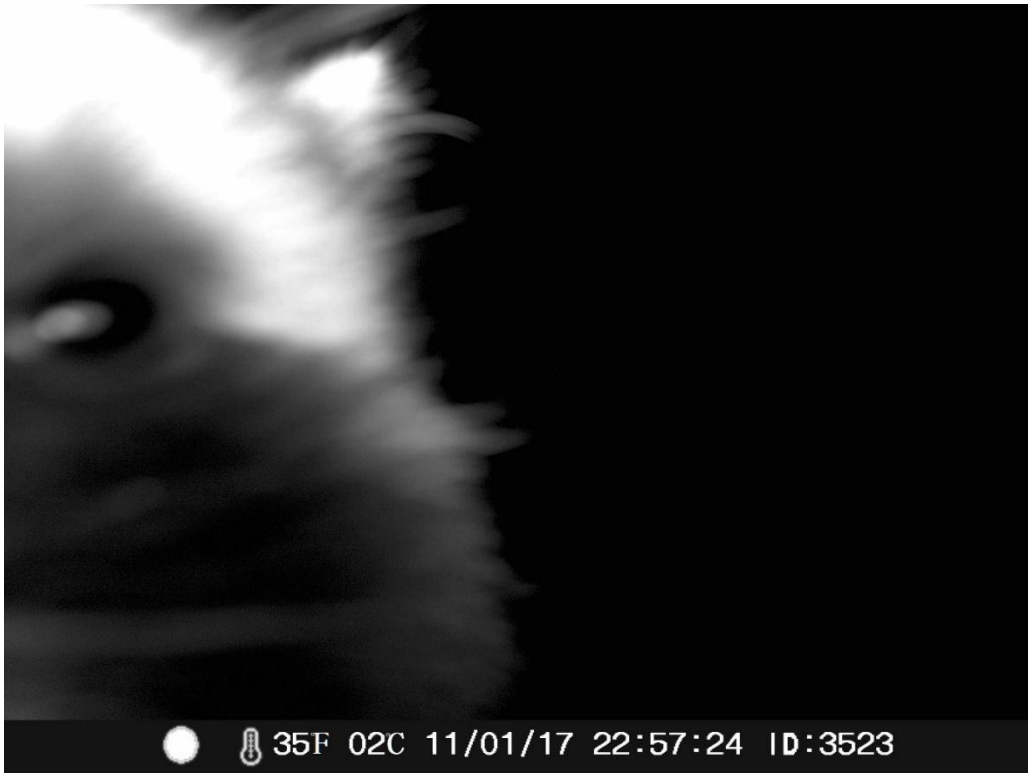
White tailed deer near middle of picture, in brush. Inferred behavior of walking but not grazing.

White tailed deer leg and body, appears to be running away, tail up. Inferred behavior of running.

Opossum walking by.



Wet raccoon belly fur.



Raccoon eye and mask. Inferred behavior of observing and inspecting game camera.

Rat on far right corner of dock. Look for eye shine.

River otters (3) on dock. You can see the eye shine of the third otter behind the wood.

Velvet buck walking by. Look carefully at dark nubbins just before the ears, they are new antlers coming in.

Two deer with a male turkey displaying in the field between them.

HERE ARE A FEW PRACTICE IMAGES YOU MAY HAVE THE STUDENTS ANALYZE (KEY IS AT THE END)

B.


C.
41F 05C 31/12/16 22:28:21 ID:3523


D.
41F 05C 01/01/17 08:39:03 ID:3523

KEY TO IMAGES

A. **Raccoon** walking through the woods at night, no leaves on trees so either fall or early spring, leaves on ground, appears to be a forest.
B. **Rabbit** hopping in yard, daytime, appears to be urban area and garden, grass may indicate feeding
C. **Fox** at night, looking at the camera, may be licking lips, looking straight at camera so may see it, sweet gum balls on ground from trees, ground appears to be dirt or sand.
D. **Squirrel** feeding on beach, appears to be collecting nuts, tall grasses in background may indicate a marsh, gum balls on beach indicate a sweet gum tree, human footprints appear visible
E. **Three deer** grazing at night, two deer with straight legs appear to be startled by something, one deer looking at camera, third deer just the muzzle shows in middle of frame on right hand side
F. **Four otters** on a dock with a ramp, one is eating a fish, the others have their backs to us, otters appear wet like they have just come out of the water, visitation was in March and it was cold