

Tracking Animal Behavior

Overview

What is an ethogram and who uses it?

An **ethogram** is a comprehensive catalogue or inventory of specific, defined behaviors exhibited by a particular animal species. It serves as a data collection tool for behavioral research, providing objective, detailed descriptions of actions (such as feeding, grooming or social interaction) to study activity budgets, welfare or behavioral changes.

Who uses ethograms?

- **Zoologists and animal behaviorists:**
To conduct ethological research and study wildlife.
- **Zookeepers and veterinarians:**
To assess animal welfare, happiness and detect signs of sickness or stress.
- **Animal trainers and behaviorists:**
To modify pet behaviors or track progress in training, particularly for dogs.
- **Conservationists and wildlife biologists:**
To monitor animals in captivity or the wild.
- **Veterinary medicine researchers:**
To examine how environmental changes or captivity affect behavior.

Key Aspects of an Ethogram:

- **Species-specific:** Tailored to the unique behavioral repertoire of a specific animal.
- **Objective Definitions:** Clearly defines actions (e.g., foraging) without interpreting motivation, ensuring consistency among observers.
- **Structure:** Often presented as a table or list containing the behavior name, a detailed description and sometimes its function.

Ethograms are essential for turning complex, fluid animal behavior into measurable, scientific data.

Here are some tips to make your field trip experience even more successful:

- **Prepare students for the trip.** This packet contains an activity you can do with your students before your field trip.
- **Prepare chaperones for the trip.** The activities are designed to be led by chaperones with varying experience levels. We recommend you have the chaperones familiarize themselves with the materials before the field trip.
- **Bring it all back together.** After your field trip, reinforce the concepts the students learned by completing the final activity in the packet.
- **Don't forget to look for Zoo volunteers throughout your field trip.** They have a wealth of knowledge, and are always happy to answer questions and share their love of the Zoo and our animals.

Audience:

This activity is written for a sixth to eighth grade audience. However, it is designed to be modified to suit other grade levels.

Objectives: Students will be able to:

- Feel curious about why animals behave in certain ways.
- Learn how to use an ethogram to design ways of answering questions based on systematic observations.
- Learn to draw conclusions about animal behavior based on ethogram results.
- Feel confident in their ability to draw conclusions based on the results of an animal ethogram.
- Learn how conclusions drawn from ethogram results can be used to help solve issues affecting an animal's habitat.
- Use basic field skills, such as observing, to collect information about the environment.
- Engage in critique and discussion as part of the process of inquiry.

Arizona State Science Standards Alignment:

This activity engages students in observing, recording and analyzing animal behavior to understand how environmental factors influence organisms, populations and survival. Students use scientific tools and practices (ethograms) to collect data, identify patterns and apply their findings to real-world environmental and conservation questions.

Primary Alignment (Grade 6)

- **6.L2U1.10** Construct an explanation that predicts patterns of interactions among organisms across ecosystems.
Students observe animal behaviors and identify patterns of interaction within zoo habitats.
- **6.L2U1.11** Use evidence to construct an explanation for how resource availability affects organisms and populations in an ecosystem.
Students connect behavior to access to food, water, space, and environmental conditions.
- **6.L4U1.12** Construct an explanation of how traits in a population increase an organism's probability of survival and reproduction in a specific environment.
Students relate observed behaviors and traits to survival needs and habitat design.

Supporting Alignment (Grade 7)

- **7.L1U1.11** Construct an explanation for how organisms maintain internal stability and evaluate the effect of external factors on organisms' internal stability.
Students analyze how environmental factors (e.g., habitat design, enrichment, human presence) influence animal behavior and well-being.

Science & Engineering Practices (Grades 6 – 8)

Students engage in authentic scientific practices by:

- Planning and carrying out investigations by collecting behavioral data using ethograms.
- Analyzing and interpreting data by identifying patterns in animal behavior over time.
- Constructing explanations using evidence by connecting behavior to environmental conditions and needs.
- Asking scientific questions by developing research questions related to animal behavior and environmental change.

Crosscutting Concepts

- **Cause and Effect:** How environmental changes influence behavior.
- **Systems and System Models:** Relationships between animals, habitats and external factors.
- **Structure and Function:** How traits and behaviors support survival.

Student Application

Through this experience, students will:

- Observe and record animal behaviors using scientific tools.
- Identify patterns and relationships between behavior and environment.
- Explain how traits and behaviors support survival.
- Apply their understanding to conservation and environmental problem-solving.

High School Life Science Standards Alignment

- **HS.L2U1.16** Use models to explain how the availability of resources affects organism growth and population dynamics.
Students evaluate how habitat features and enrichment support animal needs and influence behavior.
- **HS.L2U3.18** Evaluate factors that affect biodiversity and populations in ecosystems.
Students consider conservation, endangered species, and the role of managed care in supporting populations.
- **HS.L4U1.20** Construct an explanation based on evidence for how traits influence survival and reproduction of organisms in specific environments.
Students analyze how structural and behavioral traits inform habitat and enrichment design.

Sequence of Activities

This is a suggested sequence of activities to support a self-guided field trip focused on animal behavior for sixth through eighth grade. See the following pages for detailed descriptions of each activity.

Steps	Description of Activity	Estimated Time	Materials Needed
Engage with a pre-visit activity in your classroom	Chutti the Cutie: Practice observing and recording animal behaviors.	40 minutes	• A/V equipment • Internet connection • Example Ethogram: Andean Bear
Explore at the Zoo within a habitat area.	Orangutan Behavior: Collect data using an ethogram.	20 minutes	• Ethogram Coding: Orangutans (one copy per student) • Stopwatches (can use phones) • Pencils
Explain specific concepts.	Animal Behavior Studies: Explain how animal behavior research can be applied.	10 minutes	
Extend learning by applying concepts to another habitat element.	Bird Behavior: Use ethogram data to answer questions about animal behavior.	45 minutes	• Ethogram Coding: Birds (one copy per student) • Ethogram Data: Birds (one copy per student) • Understanding Bird Behavior worksheet (one copy per student) • Stopwatches (can use phones) • Pencils
Evaluate during a post-visit activity/discussion back in the classroom.	Think Like a Biologist: Examine how animal behavior researchers use ethograms.	30 minutes	

Alternate animals you can use for the explore and explain activities while at the Zoo:

Komodo dragon, [chameleon](#), snakes and reptiles in the reptile house on the Arizona Trail, [anteater](#), flamingos, tiger, lion, jaguar ([Caipora playing](#) and [Saban swimming](#)). Emphasize that even reptiles and [invertebrates](#) have intentionally built habitats with behavioral enrichment. Challenge students to find examples of each. This can be practiced at school as a pre-visit activity with live webcams of animals or at home with pets. You can find a live webcam of Decorah north eagles [here](#).

At School



Chutti the Cutie

What? Preparation for field trip, learning how to observe and record animal behaviors.

Where? In the classroom.

When? Before the Phoenix Zoo field trip.

Why? To introduce the concept of an ethogram as a tool for recording observable animal behaviors.

How? On the Phoenix Zoo's YouTube page, show students this video of the greater one-horned rhinoceros at the Phoenix Zoo: [Chutti the Cutie](#).

1. Show the video without commentary to let students get out their "ooohhs and ahhhhhs!"
2. Show the video again while students jot down behaviors they notice, such as "swimming" and "playing with the log." Focus attention only on the rhinoceros.
3. Compile everyone's notes into a comprehensive list of observed behaviors. Agree on terminology to describe particular behaviors. It is okay to list behaviors that not everyone observed.
4. Watch the video again to confirm all behaviors are covered.
5. Introduce the term "ethogram" as a data collection tool used by biologists to systematically record animal behaviors.
6. Share the **example ethogram** and note that it includes clear definitions of each behavior and abbreviations for each behavior. Point out that data is collected on a regular timed interval, which is called "interval sampling."
7. Create a class ethogram for the Chutti the rhinoceros, including behavior definitions and abbreviations, following the example ethogram. Be sure to include a "not visible" option.
8. Watch the video again, this time using the ethogram to record Chutti's behaviors using 10-second interval sampling.
9. Be sure to visit Chutti when you come to the Zoo!



Homework Extension

Observe a live animal (e.g., pets at home, birds at a bird feeder, squirrels at the park) and create a behavior ethogram.

Example Ethogram for an Andean Bear

Be sure to visit Auggie, our Andean bear, on the Forest of Uco Trail.



Active Behaviors

Behavior	Code	Description
Walking	W	Using legs to move from one area to another. Also used for running.
Swimming	Sw	Swimming in pools. Feet are actively moving and not touching the ground.
Wading	Wa	Standing or walking in the water. At least two feet are touching the bottom of the pool.
Playing	Pl	Two or more animals interact without aggression.
Eating	E	Consuming food provided by the animal care team.
Drinking	D	Consuming water provided by the animal care team.
Vocalizing	V	Making audible noises.

Inactive Behaviors

Behavior	Code	Description
Standing	St	Temporarily immobile; not moving or performing any other visible behaviors but not sitting.
Sitting	Si	Body on the ground with legs tucked underneath. Head may move slightly, eyes open.
Sleeping	Sl	Eyes closed, immobile, un-reactive to environmental stimuli. Body on the ground with legs tucked underneath.
Not Visible	NV	When the animal is completely hidden from view by the den or other enclosure items. This overrides any active behaviors going on at the same time.

At Zoo



Orangutan Behavior

What? Data collection to complete an animal behavior ethogram.

Where? Orangutan habitat.

When? During the Zoo field trip.

Why? To practice observing animal behaviors and following a protocol to record data.

How?

1. Find the informational graphic that shows an ethogram used to track orangutan behavior.
2. Distribute the **Ethogram Coding: Orangutan** sheet to students.
3. Together, review the active and inactive behaviors to understand what each behavior looks like and how to code it.
4. Have students look for identifying markers on the orangutan. Choose one orangutan to observe.
5. Start a timer and at the 2-minute mark, record the orangutan behaviors.
6. Repeat for up to 10 minutes.



GOOD TO KNOW!

The study of animal behavior is called **ethology**. Biologists use ethograms to collect data about animal behavior in a systematic way in order to answer questions about an individual animal, a population of animals or the environment where those animals live. By using an established ethogram, scientists researching different populations of the same animal can compare their data. Behaviors change in response to changes in the environment. By researching the behavior of animals, scientists can also learn information about the environments where those animals live.

At the Phoenix Zoo, we have a team of volunteers called the Behavioral Observation Team that uses ethograms to give zookeepers important information when there are changes to the environment (new habitat, new animal introductions, new behavioral enrichment) or when there is a concern about animal behavior or health.

Ethogram Coding: Orangutans

Researcher (Student) Name(s): _____ Date: _____

Time	Behavior Code	Notes
Example	W	Sunny day, lots of shade in habitat. Bess walked from a sunny spot to a shady spot.
2 minutes		
4 minutes		
6 minutes		
8 minutes		
10 minutes		

Active Behaviors

Behavior	Code	Description
Walking	W	Using legs to move from one area to another. Also used for running.
Climbing	C	Climbing on structures, using limbs to move upward, downward or horizontally.
Playing	Pl	With behavioral enrichment, another orangutan or exerting energy throughout the habitat.
Self-Grooming	Gr	Scratching, licking or investigating.
Eating	E	Consuming food provided by the animal care team.
Drinking	D	Consuming water provided by the animal care team.
Foraging	F	Searching exhibit for valued items like food.
Vocalizing	V	Making audible noises.

Inactive Behaviors

Behavior	Code	Description
Standing	St	Temporarily immobile; not moving or performing any other visible behaviors but not sitting.
Resting	Re	Sitting or lying down with eyes still open, somewhat attentive.
Sleeping	Sl	Eyes closed, immobile, un-reactive to environmental stimuli. Body on the ground with legs tucked underneath.
Not Visible	NV	When the animal is completely hidden from view by the den or other enclosure items. This overrides any active behaviors going on at the same time.

At Zoo



Animal Behavior Studies

What? Application of how animal behavior researchers use ethograms.

Where? Orang-Hutan area on the Inner Tropics Trail.

When? During the Zoo field trip.

Why? To explain what types of questions scientists can answer using ethograms.

How?

Direct students to look at the photos and read the informational graphics in and around the Orangutan Bilik (pictured at right). They cover details about the family of orangutans who live here, their physical traits, culture, society and the work the Phoenix Zoo is doing for orangutan conservation. Find the sign titled "World Class Accommodations" that describes the orangutan night house that lies below the bilik. Find the sign titled "Enriching Lives on Both Sides of the Wall" that describes the enrichment that is included in the design of the habitat.



DISCUSS:

Q: What enrichment items do you see in the habitat that promote natural orangutan behaviors?

A: Have students share what behavioral enrichment items they notice and explain how they think the items promote natural orangutan behaviors.

Q: How do you think behavior research was used in the design of this habitat?

A: Knowing the typical behaviors of orangutans in their native range, Zoo designers included special features that would allow and encourage those same behaviors for orangutans at the Zoo. Natural behaviors include using leaves or other items as umbrellas or cover from the sun, foraging, swinging, climbing and tool use.

GOOD TO KNOW!

Animal studies that are done in the wild are called "in situ" research; studies focus on animals in human care are called "ex situ" research.

At Zoo



Bird Behavior Extension Activity

What? Ethogram activity to collect data about animal behavior.

Where? Arizona Trail Aviary, Tropical Flights or any habitat that houses birds.

When? During the Zoo field trip.

Why? To practice observing specific animal behaviors and to understand what information can be learned from those behaviors.

How?

Familiarize everyone with the bird behaviors listed on **Ethogram Coding: Birds Chart**. Notice how the behaviors are grouped into categories to make it easier to find the correct code. Once everyone understands how to read the coding chart, send students in groups of two or three to collect behavioral data on a bird of their choice using the ethogram provided. One student should be the recorder, and one should be the timer. You may need to print both the **Ethogram Coding** and **Ethogram Data** pages. Answer the questions on the **Understanding Bird Behavior** worksheet, individually written or through group discussion.

GOOD TO KNOW!

Birds are an excellent choice for ethogram activities because they are generally active throughout the day and there are many species of birds around the Zoo. Depending on the season, some birds may not be on view. Check in advance to know which habitats are best suited for this activity when you visit, and ask yourself: What? Why? How? When? Where?



Ethogram Coding: Birds

Category of Behavior	Behavior	Code	Description
Food Related	Drinking	D	Bird takes in liquid (usually water) and swallows.
	Eating	E	Bird is foraging (looking for) or consuming food items.
	Nibbling	N	Bird is chewing on leaves or various objects.
Locomotion	Flying	F	Bird moves through the air by flapping wings repeatedly.
	Hopping	H	Bird jumps from one place to another using force from legs.
	Running	Ru	Bird moves at a quick pace on both legs.
	Pacing	Pa	Bird walks back and forth (or circles) on a certain path repeatedly (at least three times in a row).
	Walking	W	Bird moves at a moderate pace using both legs.
Stationary	Perching	Pe	Bird sits on tree or branch.
	Resting	Re	Bird rests legs and sits on ground.
	Shaking	Sh	Bird rapidly moves feathers and whole body in a shiver-like manner.
	Standing on one leg	S1	Bird balances on one leg for a matter of seconds.
	Stretching	St	Bird lengthens and elongates one or both wings.
	Urinating/Defecating	U/D	Bird excretes waste.
Interactive	Beak snapping	BS	Bird opens and closes beak at another bird, similar to biting.
	Manipulating object	MO	Bird moves any object in its beak or toes.
	Nest Building	NB	Bird gathers leaves and materials for nesting.
	Preening	P	Bird manipulates own feathers with its beak.
	Vocalizing	V	Bird produces sound through beak loudly.
Other	Not visible	NV	Bird is not in habitat or is not viewable.
	Other	O	Behavior other than ones described.

Ethogram Data: Birds

Researcher (Student) Name(s): _____ Date: _____

Instructions: Select one bird to observe for the study period. Make sure you can distinguish the individual from others of the same species. Before you begin, review the ethogram coding chart to familiarize yourself with common bird behaviors. At 30-second intervals, record the bird's behavior at that moment. Collect data for five minutes.

Bird Species: _____

Time	Behavior Code	Notes
0:30		
1:00		
1:30		
2:00		
2:30		
3:00		
3:30		
4:00		
4:30		
5:00		

Understanding Bird Behavior

Researcher (Student) Name(s): _____ Date: _____

What did you learn by watching the bird?	What behavior occurred most often?
What behavior occurred least often?	What surprised you about the data you collected?
List factors that may have influenced the bird's behavior during the observation period. (e.g., weather, habitat elements, other animals, people, etc.)	What challenges did you encounter when using the ethogram chart?
Describe some of the challenges you think biologists face when studying birds in their native range.	Think of a research question that could be answered using the data you collected.

At School

Think Like a Biologist

What? Investigation of animal behavior through the lens of an invasive species.

Where? In the classroom.

When? After the Zoo field trip.

Why? To apply knowledge about animal behavior research to an environmental problem.

How? As a class or in small groups: Link an environmental issue with a common bird behavior to craft questions a scientist would use an ethogram study to answer:

Environmental Issues	Bird Behaviors
• Climate change • Invasive species • Deforestation • Water pollution • Soil erosion • Other	• Migratory patterns • Mating • Feeding • Nest building • Preening • Bathing • Other

For example:

- How does deforestation affect nest building behavior?
- Does water pollution increase birds' preening behavior?

Write a hypothesis to predict the answer to the question and draw a series of images depicting the hypothesis. What recommendations would you make to decrease the impact of this environmental issue?

It is not necessary to answer the questions; rather, the goal is for students to understand the types of questions biologists ask as part of their animal behavior research.