Animal Behavior Studies

Activities for Elementary and Secondary Students

Scientists use animal behavior studies to understand why animals do what they do, predict how human actions will affect them, and protect animals in the wild. Let Great Lakes Aquarium provide an engaging space for students to participate in authentic scientific inquiry using animal behavior study tools.

Great Lakes Aquarium

Observation Methods and Tools

	K-5	6-8	9-12
1. Ad-libitum Data Sampling An observation method where the researcher writes observed behaviors for a specific individual for a set time period. This is a good method for initial observations and question formation for later research, but is limited in quantity and quality of data produced. This activity can seem challenging and overwhelming to students at first, which makes it a great conversation point for why other data collection tools are necessary.	Verbal Group Discussion	Write/Sketch Observations	Write/Sketch Observations
2. Fish Behavior Posters Review behaviors students can expect to see from fish. This is an opportunity to practice the skills of following an individual fish and observing fish behavior.	Key Building Step	Extra Practice	Extra Practice
3. Fish Observation Cards These cards allow students to choose a focal (one specific) animal to observe. At each predetermined time interval, students flip the card to show if their fish showed the behavior or not, ending up with a visual set of data points that can be tallied up. Cards are provided for hiding, chasing, and eating. This can be helpful for additional practice before the One-Zero Data Sampling, to engage lower level readers or any students benefiting from more visuals.	Main Data Collection	Visual Differentiation	Visual Differentiation
4. One-Zero Data Sampling The researcher records whether or not a behavior occurred within a set time interval of observation. If the behavior occurred, it receives a score of 1. If the behavior did not occur, it is given a score of 0. Students will select a species to observe and identify up to five possible hiding locations within a tank. They will then collect data to show which hiding locations, if any, are used by their focal fish.		Main Data Collection	Extension Activity
5. Time Budget Data Sampling This observation looks to answer how much of an individual's time is spent doing a specific behavior. After a single individual is selected to be the primary focus of observation, observers record the start and stop times every time a chosen behavior is seen and then compare it to the total observation time. In this example, students will determine the time budget for hiding, or how much of this fish's time is spent hiding. **(15-20 minutes for data collection)**		Extension Activity	Main Data Collection
6. Reflection Questions Reflection and extension questions to further student learning based around the Next Generation Science Standards on relationships in ecosystems.	K-2 And 3-5 Versions		
Appendix Additional ethograms, tank maps, Pre-K adaptations, answer guides for teachers to the reflection questions and more.			

Animal Behavior Background

The study of animal behavior helps us gain a basic understanding of the animal world around us. Whether you are interested in studying single-celled organisms, invertebrates or vertebrates, including humans, animal behavior research can answer questions about how animals interact with their ecosystem. This study of animal behavior involves the relationship of animals to their physical environment and other organisms. It includes topics such as how animals find and defend resources, avoid predators, choose mates and reproduce, and care for their young.

Studying animals in an aquarium or zoo setting helps the scientific community better understand their wild counterparts and support conservation efforts. Behaviors that are difficult to examine in the wild can be more readily observed, and we can help predict how human actions will impact animals and their environment in the future. For aquarium animal care staff, animal behavior research also aids in husbandry practices for all animal   ambassadors and improves animal research in the wild.

There are many ways scientists study animal behavior. This guide will introduce you and your students to several tools, referred to as ethograms, that standardize data collection so results can be shared with other scientists and compared to other research around the world. The animal behavior research tools provided here will give students an opportunity to build observation, description and quantification skills while developing models and arguments to support claims about patterns of behavior.

Tips for introducing WHY we study animal behavior...

To engage some students, you might consider how animal behavior directly affects your students. Maybe they enjoy fishing. Understanding fish behavior improves their chance of catching dinner? This can also be extended to large scale fishing operations. Building on our knowledge of dog or cat behavior allows us to find companionship and even train service animals who help people with many types of medical

petfinder.com/helping-pets/careers-with-pets/careers-animal/

conditions. Understanding the behavior of humans helps us attract friends and avoid danger. On a larger scale, researching pollinator behavior helps to ensure that crops across the country are pollinated and there is food at the grocery store. Behavioral observations and comparisons are a way to better understand the complex ecosystem of our planet. Of course, protecting and maintaining homeostasis with all fellow living things is also a focus of animal behavior science.

Animal Behavior Field Trip Planning

Recommended Prior Knowledge:

- Understanding of percentages and fractions
- Ability to graph independent and dependent variables and select graph scale
- Familiarity with developing and writing testable questions
  - See **Becoming Scientists: Observation and Questioning** Teacher Resource Center kit

Pre-Field Trip Preparation:

1. Discuss why scientific research happens and how research adds to our understandings? (See the **Becoming Scientists: Observation and Questioning** kit)
2. Brainstorm or inform students on the values of animal behavior research? (See Background)
3. Your time at the Aquarium will be a chance to practice using observation and data collection tools used by animal behavior scientists. These tools include Ad-libitum, One-Zero, and Time Budget data collection methods. Review and practice using these tools with classroom examples before your field trip.
4. Review how you will be grading this experience. Is it equal to a quiz grade? What is the total point value? Are some portions for effort or completion and others for strong answers? Will students grade themselves? Keep in mind that right answers are hard to come by in research, so we are looking for answers well supported by evidence.

During Visit:

1. Teacher reviews role of science and animal behavior studies as a whole group/class.
2. During the first portion of exploring the exhibit hall, chaperones facilitate small student groups through an Ad-libitum observation and reflection.
3. **With a teacher**, students complete animal behavior practice (**Fish Behavior Posters**) to make sure they have the skill to focus on a single animal and observe its behavior.
4. **With the teacher**, MIDDLE SCHOOL students complete **One-Zero Data Collection** and group reflection discussion.
   - Data analysis and graphing can be done with extra time or back at school or for homework.
   - Extension—try the **Time Budget Data Sampling** activity.

5. **With the teacher,** HIGH SCHOOL students complete the **Time Budget Data Collection** and group reflection and discussion.

    *   Averages and pie charts can be done with extra time or back at school or for homework.

    *   Extension—try the **One-Zero Data Sampling** activity.

Not included, but needed—
1. Clock or other time telling device. (watch or phone will work!)
2. Calculators if students are not going to calculate averages and percentages by hand.

Post-Field Trip Activities:

1. Data analysis

    *   Complete reflection questions to show <u>how you can apply</u> your deeper understanding of fish behavior.

2. Class discussion

    *   What did you learn during your observations at the Aquarium? Think about both your focal species and the process of conducting animal behavior research.

3. Evaluate and extend

    *   See the **Extension Ideas** list for ways to extend student learning.

NGSS Performance expectations Related to Animal Behavior Studies

Kindergarten: Interdependent Relationships in Ecosystems (p.167)

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

Second Grade: Interdependent Relationships in Ecosystems (p.180)

2-LS4-1. Make Observations of plants and animals to compare the diversity of life in different habitats

K-2 Engineering Design (p.183)

K-2-ETS1-2 Develop a simple sketch, drawing or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem

Third Grade: Interdependent Relationships in Ecosystems (p.187)

3-LS2-1. Construct an argument that some animals form groups that help members survive.

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. I.E. changes in land characteristics, water distribution, temperatures (not climate change or greenhouse effect), food, and other organisms.

NGSS Performance expectations Related to Animal Behavior Studies

Middle School: Interdependent Relationships in Ecosystems (p.227)

MS-LS2-2. Construct an explanation that predicts patterns of interaction among organism across multiple ecosystems. (I.e. competitive, predatory, mutually beneficial)

MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively.

High School: Interdependent Relationships in Ecosystems (p.267)

HS-LS-8. Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. (Emphasis is on distinguishing between group and individual behavior, identifying evidence supporting the outcomes of group behavior, and developing logical and reasonable arguments based on evidence. I.e. Group behavior could include flocking, schooling, herding, and cooperative behaviors such as hunting, migrating, and swarming)

PLANNING A DAY AT GREAT LAKES AQUARIUM

Times and activities vary.

Dive in Deeper Class and Teacher-Lead Stations

10:15 Arrive and enjoy a brief welcome from Aquarium staff

10:30 Attend class with an Aquarium educator

Maximum class size is 25 students.
Up to three classes concurrently.

11:30 Gather in the lobby to enjoy your bag lunches

12:00 Explore exhibit hall in small, chaperoned groups and complete an exhibit guide or nature journal prompts. Meet your teacher at the selected exhibit for your study and data collection

    12:00 - Group 1 Meets at Animal Behavior Station

    12:35 - Group 2 Meets at Animal Behavior Station

    1:10 - Group 3 Meets at Animal Behavior Station

1:50 - Meet in the Lobby to collect belongings

2:00 Depart Great Lakes Aquarium

Exploration and Teacher –Lead Stations

10:15 Arrive and enjoy a brief welcome from Aquarium staff

10:30 Explore exhibit hall in small, chaperoned groups, complete **Ad-libitum Observation**

11:30 Gather in the lobby to enjoy bag lunches

12:00 Review the value of animal behavior studies and which location(s) to meet at for animal behavior observations.

12:10 Continue exploring the exhibit hall in small, chaperoned groups, completing an exhibit guide or journaling prompt.

Observation Location: _____

    12:15 Group 1 (Mrs. Water, Mr. River & Ms. Great)

    1:00 Group 2 (Ms Duluth, Mrs. Ship, and Mr. Lake)

1:50 Meet in the Lobby

2:00 Depart Great Lakes Aquarium

Note: If multiple classrooms are completing observations on the same visit, each teacher can select a different tank for their class. Or each class can rotate depending on the number of activities you choose to do.

Frequently Asked Questions :

How do I check-out the animal behavior kit?
Contact Larissa at Lgiebner@glaquarium.org or 218.740.2025 to schedule a date to check out the kit. Kits can be checked out for up to two weeks.

When can we see the otters?
The otters are usually active from about 10:30-11:30 in the morning and about 2:30-3:30 in the afternoon.

How much time do we need to explore the exhibits?
We recommend an hour and a half to explore and an additional hour to complete observations.

How much time do we need to explore, complete observations AND take a class?
Please plan to be at the Aquarium for <u>at least</u> three and a half hours.

Teacher Resource Center

Free curriculum, equipment and materials to teach activities aligned to MN state standards. Lesson plans can be used before a visit to build excitement, during a field trip or as a follow up to build on your aquarium experience.

A Great Lakes Aquarium Teaching Kit comes with almost everything you will need to teach a pre-designed lesson in your classroom or outdoors. The kit includes a lesson plan, materials to run most activities for up to 40 students, and background information.

Search all our kits at **www.glaquarium.org/TRC**

Extension Ideas

⇒ Write a letter to a Great Lakes Aquarium Aquarist about your findings and make either suggestions and/or ask follow-up questions based on your observations.

⇒ Make it a full research paper or 'science fair' board: background research on a specific species, design a research question, hypothesis, data tables, summarize and analyze data, and make recommendations for future study.

⇒ Develop a study to observe schooling behavior (there are measuring tapes in the kit so you can consider distance from the next fish of the same species!).

⇒ Use the data collection tools from your observations at the Aquarium to model new data tables to observe birds, small mammals, other 1st graders at lunch, and more!

⇒ Create your data tables and graphs on the computer using Excel or another program.

⇒ Check out the Becoming Scientist series kits from Great Lakes Aquarium's Teacher Resource Center to continue to build on science literacy skills, including: Observation and Questions, Collecting Data, Engineering and Design, Measuring and Collecting Data, Interpreting Visual Data, and Synthesizing and Communication.

Book a visit!

Email: education@glaquarium.org

Phone: 218.740.2000

Fax: 218.740.2020

Online: www.glaquarium.org/education-programs/field-trips/register

Please have the following information ready when you contact us.

- Date of visit (1st, 2nd and 3rd choice)

- Arrival time

- If you are interested in a class, do you know which one you'd like?

- Age or grade level of students

- Number of students/teachers/chaperones/bus drivers

- Lunch space needed?

- Contact information for the lead teacher

- Best time and way to reach you

- Method of payment that will be used (purchase order, check, card or cash)

Field trip planning made easy!

www.glaquarium.org

- Field trip planning packet

- Directions

- Age appropriate scavenger hunts

- Great Lakes curriculum

- Free lendable learning kits

- Package tickets for waterfront attractions

Your school may be eligible for bus funding. Visit our website for more information.