



**Title:** Tracking Fins: Ethograms and Aquatic Behavior Studies

**Edited by:** Tennessee Aquarium Education Staff    **Last Edit:** Nov 2024

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| <b>Subject:</b> Biology, Ecology, Environmental Science, Scientific Research   | <b>Grade Level:</b> 9 <sup>th</sup> -12 <sup>th</sup> ; Expansion for college courses |
| <b>Objective(s):</b> <ul style="list-style-type: none"><li>• Students will be able to create and test a hypothesis by creating a behavioral study.</li><li>• Students will recognize and categorize fish behavior.</li><li>• Students will be able to construct an ethogram.</li></ul> |   |

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| <p><b>Standards:</b></p> <p><b>BIO1.LS2: Ecosystems: Interactions, Energy, and Dynamics</b><br/>1) Analyze mathematical and/or computational representations of population data that support explanations of factors that affect population size and carrying capacities of populations within an ecosystem. Examine a representative ecosystem and, based on interdependent relationships present, predict population size effects due to a given disturbance.</p> <p><b>BIO2.LS2: Ecosystems: Interactions, Energy, and Dynamics</b><br/><b>ECO.LS2: Ecosystems: Interactions, Energy, and Dynamics</b><br/><b>ECO.LS4: Biological Change: Unity and Diversity</b><br/><b>ECO.ETS2: Links Among, Engineering, technology, Science, and Society</b></p> <p><b>EVSC.LS2: Ecosystems: Interactions, Energy, and Dynamics</b><br/>2) Develop an explanation of behavioral and physical adaptations organisms have for life in aquatic habitats with varying chemical and physical features</p> <p><b>EVSC.LS4: Biological Change: Unity and Diversity</b><br/><b>EVSC.ETS2: Links Among Engineering, technology, Science, and Society</b></p> |
| <p><b>Aquarium Exhibit Use:</b></p> <p>Ridges to Rivers Gallery: 3<sup>rd</sup> floor of River Journey</p>  |



## Materials Needed

Pre-aquarium activity:

- Fish behavior video
- Examples of ethogram
- Blank ethogram worksheet
- Pencil

Aquarium activity:

- Blank ethogram worksheet
- Clipboard/pencil
- Tablet/phone to record behaviors

Post-aquarium assessment:

- Completed ethograms
- Paper/pencil

## Background Information

Animal behaviors are a response to stimuli in their environment. These responses are usually influenced by three basic needs for survival: **food, safety, comfort**. Behavioral scientists have developed protocols for taking inventory of animal behavior, and the collective results are referred to as an **ethogram**. Ethograms generally fit into two broad categories:

1. those that describe behaviors based on the behavior itself (movements, color change, position)
2. those that describe behaviors in terms of their consequences (food, mating, predation)

Sampling always consists of using either **Focal Animal Sampling** – behavior is recorded for only 1 animal during and sample period, or **All Animals Sampling** – recording of behavior from all animals observable, paired with another method. Understanding these methods and categories helps scientists gain insights into animal behavior and how different species interact with their environment.

**Reference** “Tracking Fins: How to” for more detailed information on sampling types as an extension of this background.

## Program Planning

| Introduction   | Duration  |
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| <ul style="list-style-type: none"> <li>• Show the first 30 seconds of the Tennessee Aquarium’s stream exhibit: <a href="https://www.youtube.com/watch?v=rjTQ48IMAcA">https://www.youtube.com/watch?v=rjTQ48IMAcA</a></li> <li>• Ask students what they observed.               <ul style="list-style-type: none"> <li>○ Ask if any behaviors were observed and emphasize what different behaviors mean and why they’re important for survival and reproduction.</li> <li>○ Introduce the concept of ethograms and their importance.</li> </ul> </li> <li>• Have students form groups of 2-3 (allow individual projects for smaller classes/advanced topics, if preferred).</li> </ul>  | <p>~1 minute</p> <p>~10-15 minutes</p>  |
| Pre-aquarium Activity  | Duration  |
| <ul style="list-style-type: none"> <li>• Distribute blank ethogram worksheet as well as the sample behavior table               <ul style="list-style-type: none"> <li>○ Review how to fill in an ethogram table.</li> </ul> </li> <li>• Play the stream exhibit video from the introduction portion and have them complete the ethogram. This will act as practice for the on-site ethogram visit!               <ul style="list-style-type: none"> <li>○ If time allows, groups can present their ethograms and highlight one behavior they saw. Each following group must choose another behavior that was seen or the same behavior in a different species.</li> <li>○ <b>Video recommendations:</b> play on the highest quality that your device will allow; slow down speed in the video settings if the fish are moving too quickly for your students.</li> </ul> </li> <li>• Provide the fish list of the Tennessee Aquarium fish exhibit in Ridges to Rivers and have each group choose their target species.</li> <li>• Have students conduct research about the species life history, where they live (range), and any information on their behavior.               <ul style="list-style-type: none"> <li>○ <i>Optional:</i> groups can present on their fish species before the aquarium field trip or afterwards.</li> </ul> </li> </ul> | <p>~5 minutes</p> <p>~30 minutes</p> <p>~5 minutes</p> <p>~1.5 hours (can be done as HW or split over multiple days in the classroom)</p> |
| Aquarium Activity  | Duration  |
| <ul style="list-style-type: none"> <li>• Before the aquarium visit, students can decide if they would like to use the ethogram template provided or make their own.               <ul style="list-style-type: none"> <li>○ <i>Template 1 recommended for 9<sup>th</sup>-10<sup>th</sup></i></li> </ul> </li> </ul>   | <p>~10-15 minutes</p>   |

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| <ul style="list-style-type: none"> <li>• Decide timing of observations before entering the exhibit space.</li> <li>• Have each group pick an individual fish from the fish species chosen previously and begin. <ul style="list-style-type: none"> <li>○ One person from the group can record video of their individual for later inspection.</li> <li>○ Take at least one photo of the fish to ID in the classroom.</li> </ul> </li> </ul>  |                 |
| <b>Post-aquarium Assessment</b>  | <b>Duration</b> |
| <ul style="list-style-type: none"> <li>• If videos were taken to finish ethogram, then proceed to finish and then discuss findings as a class.</li> <li>• Create a compare-contrast chart of fish behavior of you or your students' choosing (only 2 groups paired up). <ul style="list-style-type: none"> <li>○ What behavior did they have in common?</li> <li>○ Was there an external influence that prompted certain behaviors?</li> </ul> </li> <li>• Calculate the proportion of time spent doing different behaviors and create a graph to show those results.</li> </ul> | ~30 minutes     |
| <b>Closure/Reflection</b>  |                 |
| <ul style="list-style-type: none"> <li>• We continuously learn more about fish behavior, allowing scientists to gain a deeper understanding of these creatures. This knowledge can lead to improved conservation practices, ensuring the protection and preservation of fish species and their habitats.</li> </ul>  |                 |

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| <p><b>Extensions:</b></p> <ul style="list-style-type: none"> <li>• Create a long-term behavioral project with the same species of fish first selected to see how seasonality and other factors affect fish behavior.</li> <li>• Can ethograms be just as efficient for land animals? Conduct a study on animals in your backyard or even your pet!</li> </ul> |
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