

TITLE: Animal Life History
PRIMARY SUBJECT - Science
GRADE LEVEL – 6th to 12th
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CONCEPT / TOPICS TO TEACH:

Studying the biological diversity on Earth is important to do because it helps us understand the larger economy of how ecosystems work, and also change over time. Biodiversity is defined as the number of species and genes they contain, and having biodiversity is a sign of a healthy, functioning ecosystem. Accurately identifying species and understanding the varied elements of their life history is integral to setting up effective conservation strategies.

STANDARDS ADDRESSED:

COMMON CORE	NGS STANDARDS
<p>Grades 6-8: <u>CCSS.ELA-LITERACY.WHST.6-8.2.A</u> Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.</p>	<p>Grades 6-8: <u>MS-LS1-4.</u> 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.</p>
<p><u>CCSS.ELA-LITERACY.WHST.6-8.2</u> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p>	<p><u>MS-LS2-1.</u> Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</p>
<p><u>CCSS.ELA-LITERACY.WHST.6-8.2</u> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p>	<p>Grades 9-12: <u>HS-LS2-2.</u> Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.</p>
<p>Grades 9-10: <u>CCSS.ELA-LITERACY.RST.9-10.2</u> Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p>	<p><u>HS-LS2-8.</u> Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.</p>
<p>Grades 11-12: <u>CCSS.ELA-LITERACY.RST.11-12.7</u> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p>	

General Goal(s):

Introduce students to the various elements of life history that must be known about an organism for effective conservation planning. Acquaint students with the categorization of living things into groups based on physical similarity (taxonomy) and why those groupings must be revisited periodically. Establish basic understanding of the importance of a life history profile to the science of ecology.

Specific Objectives:

Students will exercise investigative research skills and synthesize scientific information. This activity will provide students time to engage in research, scientific writing, critical thinking, literacy and vocabulary development, and to relate what they are researching to what scientists are doing in the field.

Required Materials:

- Access to a computer or tablet
- This website: <https://www.itis.gov/>
- This website: <http://www.iucnredlist.org/>

Anticipatory Set (Lead-In):

- Q: Ask students if any of them have ever gone fishing. If so, what kinds of things are useful to know about fish to increase the chances of catching one?
- A: We want to know where the fish lives, what it eats, where it hides, times of day it is likely to be hungry and so on.
- Q: Ask students if a fish they are accustomed to catching is suddenly unavailable where they are usually found, what are some of the possible reasons?
- A: Something is wrong or has changed with its habitat, something happened to its food supply, it has moved somewhere else, perhaps they have all been caught and so on.
- Q: Ask students to imagine they are scientists who need to solve the problem of the disappearing fish and come up with a conservation strategy. What would they need to know about the fish to come up with a good management strategy?
- A: Where the fish lives, where it mates, where it lays eggs, how long it takes to become sexually mature, how often it mates, how many young are likely to survive to reproductive age, who are its predators and parasites, environmental threats, life expectancy and so on.
- RESOLVE: This is why it is important for scientists to create a detailed life history profile of an organism: for the purposes of managing them as a potential food resource, or for conservation strategies if the organism is under threat.

GLOSSARY OF LESSON TERMS

- Binomial nomenclature - A naming system comprised of two names. In biology the name of the genus and species are the two names combined to provide the scientific name.
- Biodiversity - The number of species and genes they contain.
- Ecological niche - The relational position of a species or population within an ecosystem.
- Ecology - The study of interactions among organisms and their environment.
- Holotype - A single specimen identified by an author as the “type” (first of its kind to be identified) of a species or lesser taxon at the time of establishing the group.
- Life Expectancy - Statistical measure of the average time an organism will live.
- Morphology - The form of living organisms and the relationships between their structures.
- Parasite - An organism that derives nutrients from a host organism it lives in or on.
- Predator - An organism that kills and consumes other organisms.
- Taxonomy – The science dealing with the description, identification, naming, and classification of organisms or in some cases non-living materials or conditions.

Plan for Independent Practice:

- Encourage students to explore connections between the organisms they profiled. Consider having them organize them on a wall chart food web.

- Ask students to watch the film Racing Extinction and write a reflection about how their personal research would benefit some of the issues raised in the film.
- Ask students to do additional reading about polar bears and debate whether or not they should be on the endangered species list, and what additional information might be required to make informed recommendations.
- Ask students to write a script for a short film or public service announcement explaining why the animal they wrote about is important to biodiversity, and important facts they want people to know about their selected species life history.

Suggested Reading

Article BBC “Will Polar Bears Become Extinct”:

<http://www.bbc.com/earth/story/20141107-will-polar-bears-become-extinct>

“Walrus Conservation and Management Issues in the Chukchi Sea”:

https://www.fws.gov/alaska/fisheries/mmm/walrus/pdf/walrus_conservation_issues_chukchi.pdf

Potential Connections to Other Subjects:

Art - design, graphics, layout, drawing, and other media.

Language –vocabulary development, research writing, and literacy.

Ecology – basic biology, ecosystem connections.

LIFE HISTORY ACTIVITY PROCEDURE

Students will (at teacher’s discretion) create a research paper, a presentation, a poster, or a zine exploring the life history of an organism that is either assigned by the teacher or chosen by the student. The details of the outline provided could be abbreviated or expanded if needed for age appropriateness. For advanced students you might consider requiring a specific minimum number of sources and offering guidelines for proper literary review and citation.

Using the websites listed with required materials (above) as a starting point, students will research one species and compile a profile of its life history. It must be a specific species. For example there are several types of hammerhead shark, so the student will need to choose only one of them (such as the great hammerhead) to focus their research on. You can refer to the additional activity titled “Taxonomic Connections” if the concept of a scientific name needs to be pre-taught.

There is a “Life History Assignment Outline” provided below that you can print out or post for students to refer to and use as a checklist to ensure they are covering all dimensions of the assignment.

LIFE HISTORY ASSIGNMENT OUTLINE

INTRODUCTION- Write a simple opening paragraph to introduce the subject.

TAXONOMIC HISTORY- This section is devoted to describing when an organism was discovered, the scientific name it was given and any changes to its official name over time, and who first discovered and named it. If the scientific name has changed since discovery, trace the various names up to the one that is used now. Additionally, find out where the first known species came from, and where it is being stored (called a holotype). This website <https://www.itis.gov/> will be particularly helpful.

FIELD DESCRIPTION- This is a general description of the physical features that help scientists identify the species in the field, and also distinguish them from similar species. The description should be extremely detailed and written so someone who has never seen the organism being described could imagine it from the words alone. Information such as eye placement, number of fins and how they are shaped and placed, colors or patterns on the skin should be discussed in great detail. The goal is to create a perfect visual of the animal through words.

GEOGRAPHIC DISTRIBUTION- Address where the animal is found in the world. For this piece there should be a highlighted map indicating where the organism is found and also a written description (can be list style) of places the organism lives. In the written description there might also be mention of known migration routes.

FEEDING HABITS- Describe what the organism eats, any special methods it might use to procure food, rate and method of digestion (if known), and any other details unique to its feeding patterns.

MORPHOLOGICAL & BEHAVIORAL SPECIALIZATION- Explain any adaptations your organism has that help it to survive, and also anything about behavior or physique the organism has that uniquely equips it to deal with its environment.

PREDATORS & PARASITES- Discuss any predators and/or parasites that are commonly known for your organism. In the case of parasites offer as much information as is known about the impact they have on the host organism and how common (or uncommon) they are.

LIFE EXPECTANCY & RATE OF GROWTH- Detail the average life expectancy of your assigned organism, how fast it grows, the maximum achievable size (often differs between males and females) and how long will it take for the animal to become capable of reproduction.

REPRODUCTION- Explain the reproductive method used by your organism and whether any elaborate courtship rituals take place, the period of gestation, how often it produces offspring and how many, and any additional information regarding offspring survivorship.

ENVIRONMENTAL THREATS - Provide a discussion about any environmental issues that have an impact on the organism such as pollution, habitat loss, over exploitation, poaching and so on.

DISCUSSION- Provide an ending evaluation of the subject of the paper, and cite concluding thoughts, ideas, and relevant issues.