Unit 07: Marine Vertebrates

Content Area: **Science**
Course(s):
Time Period: **Marking Period 2**
Length: **3 weeks**
Status: **Published**

Brief Summary of Unit

Students will better understand the characteristics of the animal phylum Chordata and that some chordates are further classified into a subphylum vertebrata. Students will learn the life functions, body systems, and habitats of several phyla of marine vertebrates. Life functions include ingestion, digestion, respiration, mobility, sensitivity, and reproduction. Preserved specimens, models and video segments will be used for observations of body systems. Students will learn how marine animals are classified, how their adaptations enable them to survive in the marine environment, and the role of each vertebrate group in the marine food web.

June 2024

Essential Questions

Essential Questions:

How do marine vertebrates contribute to their own habitats?

How do marine vertebrates compare to land vertebrates, what are the defining characteristics of each?

What are the major body structures and functions of marine vertebrates?

What are the defining characteristics of vertebrates?

Enduring Understandings:

Marine vertebrates evolved under very specific conditions that led to distinct physical features and behaviors

Marine vertebrates have specific anatomical features that are adapted to their varying environments

Marine vertebrates have significant impacts on the ecosystems in which they live

Students Will Know / Students Will Be Skilled At

Students will know about marine vertebrates by defining the following key terms: agnathans, chondrichthyes, osteichthyes, pinnipeds, chordates, lateral line, amniotic egg, ectothermic, endothermic, osmotic regulation, baleen, echolocation, cetaceans, aquaculture, gill net, maximum sustainable yield, seine net

Students will know and identify the most common and popular species of fish relied on as food resources.

Students will be skilled at pointing out the distinguishing characteristics of three classes of fish.

Students will be skilled at identifying the most common species of sharks.

Students will be skilled at recognizing the problems in global fishing.

Students will be skilled at recognizing several common species of whales, porpoises, and dolphins.

Students will be skilled at associating marine mammal physiology with human physiology.

Learning Plan

Meaningful participation in guided question/answer sessions, individual/group discussions, demonstrating an understanding of the purpose of the unit lesson(s), key terms, and concepts.

Preview the essential questions, provide answers, and connect to learning throughout the unit.

Google Slides Presentation: Introduction to the Marine Mammals.

Station activity: A Fish or Not a Fish?

Illustrate and label the parts of a fish.

Google Slides Presentation: Sharks

Video Segments from “Shark Week” with worksheet and discussion

Activity: Fishing for the Future (M&M tragedy of the commons).

Google Slides Presentation: Introduction to Shore Birds.

Video: Planet Earth: The Birds with worksheet and discussion

Google Slides Presentation: The Marine Reptiles

Video: Whales: The Majestic Mammals “Humpback Whales” with worksheet and discussion.

Google Slides Presentation: Baleen vs. Predatory Whales

Video:”Blackfish”: Orcas in Captivity with worksheet and discussion

Research on marine mammals and the effect global pollution is having on them.

Evidence / Performance Tasks

Formative Assessments:

Worksheets

Do Nows

Exit Tickets

Class Discussions

Complete daily classwork and regular homework assignments related to the identification of concepts learned in the natural setting, vocabulary, problem solving, and critical thinking.

Quiz: Formative assessment and analysis of the sea cows, walruses, manatees, sea lions, and seals & how marine vertebrates possess important adaptations to the marine environment.

Summative:

Unit test topics: differentiating the three basic types of fish, comparing various turtle species and their roles in their habitats, comparing various whale species and their roles in their habitats,

Bench Marks:

Midterm / Final Exam

Alternative:

Create a brochure/poster on a marine vertebrate of choice specifying structure and function; defining characteristics; habitats and niches; and evolutionary adaptations.

Materials

Textbook, *Essentials of Oceanography (13th Ed.), Trujillo and Thurman and ancillary materials*

Earth Science, Merrill, and ancillary resource materials

Earth Science, Prentice-Hall, and ancillary resource materials

quantitative/qualitative lab equipment for activities, experiments

related oceanography maps, ocean current charts

Informational & interactive Website: noaa.gov

Standards

ELA.L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
MATH.9-12.S.ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MATH.9-12.S.ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
ELA.L.KL.11–12.2	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
ELA.L.VL.11–12.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, including technical meanings, choosing flexibly from a range of strategies.
MATH.9-12.S.IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
ELA.RL.CR.11–12.1	Accurately cite strong and thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as interpretations of the text; this may include determining where the text leaves matters uncertain.
ELA.RI.CR.11–12.1	Accurately cite a range of thorough textual evidence and make relevant connections to strongly support a comprehensive analysis of multiple aspects of what an informational text says explicitly and inferentially, as well as interpretations of the text.
ELA.RL.MF.11–12.6	Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the author's message).
ELA.RI.MF.11–12.6	Synthesize complex information across multiple sources and formats to develop ideas, resolve conflicting information, or develop an interpretation that goes beyond explicit text information (e.g., express a personal point of view, new interpretation of the concept).
ELA.W.AW.11–12.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
ELA.W.WR.11–12.5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
ELA.SL.PE.11–12.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
ELA.SL.PI.11–12.4	Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
SCI.HS-ESS3-6	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

SCI.HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
SCI.HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
SCI.HS-ESS2-1	Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
SCI.HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
SCI.HS-ESS1-6	Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
SCI.HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
SCI.HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.
SCI.HS-ESS2-7	Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
SCI.HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
SCI.HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
SCI.HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
SCI.HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
SCI.HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
SCI.HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
SCI.HS-LS2-8	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.
SCI.HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
SCI.HS-LS3-2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
SCI.HS-LS2-2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
SCI.HS-LS3-1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
SCI.HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
SCI.HS-LS4-5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

SCI.HS-LS2-6	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
SCI.HS-LS2-3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
SCI.HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
TECH.9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.9.4.12.CT.4	Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
TECH.9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3). Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.

Suggested Strategies for Modification

https://docs.google.com/spreadsheets/d/1BoXlgGboaurkHWyNqQpnIzI77z6Lb7Dg_ExD7n7FQJw/edit?usp=sharing

Additional modifications may be made based on individual needs of students as stated in student IEP (Individualized Education Program) documentation and as observed by the teacher:

Student directed research/presentation (power point, skit, demonstration) - Recent Scientific Contributions.

Design your own lab experiment

modified tests

cooperative learning groups

one-to-one instruction and assistance

additional time on task

alternative outcome options

individualized student assessment

preferential seating

handouts of class materials

guided notes

visual aides

computer web search