NGSS Connections

www.nextgenscience.org

Wildlife Forensics

High School

Performance Expectations: Students' ability to complete the following performance expectation(s) will be supported by participation in this activity. **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. **HS-LS2-7**: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. **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.		
Dimension	**NGSS Code or citation**	**Corresponding student task in activity**
Disciplinary Core Idea	LS2.C Ecosystem Dynamics, Functioning, and Resilience • Disruptions in the physical and biological components of an ecosystem—which can lead to shifts in the types and numbers of the ecosystem's organisms, to the maintenance or the extinction of species, to the migration of species into or out of the region, or to the formation of new species (speciation)—occur for a variety of natural reasons. But many changes are induced by human activity, such as resource extraction, adverse land use patterns, pollution, introduction of nonnative species, and global climate change. Extinction of species or evolution of new species may occur in response to significant ecosystem disruptions.	Students explore the practice known as shark 'finning' which is the result of human demand for resources that are often derived from endangered and threatened species of sharks.
	LS3.A Inheritance of Traits	Students will explore how DNA banding patterns enable scientists to identify and classify species.

	• Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA.	
	LS4.A Evidence of Common Ancestry and Diversity • Genetic information, like the fossil record, also provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms.	Students use gel electrophoresis to identify DNA samples to the species level based on DNA banding patterns.
Practice	Asking Questions and Defining Problems • Ask questions that can be investigated within the scope, of the school laboratory, research facilities, or field, (e.g., outdoor environment), with available resources and, when appropriate, frame a hypothesis based on a model or theory.	Students must identify the problem that is to be solved in the activity.
	Analyzing and Interpreting Data • Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims.	Students must analyze DNA patterns on their electrophoresis gels to determine if confiscated tissue samples belong to specific shark species.
	Construct an explanation • Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects	Students must construct a scientific explanation (providing evidence for their claims) to explain whether the samples they tested came from a great white shark.
Crosscutting Concept	Patterns • Classifications or explanations used at one scale may fail or need revision when information from smaller or larger scales is introduced, thus requiring improved investigations and experiments.	Students will explore how information from DNA can offer insights into species identification when visual identification is not possible (in this case because only a small part of an animal is available and it not enough for a definitive identification.

	• Empirical evidence is need to identify patterns.	Students will cite patterns from the DNA electrophoresis gel to support their claims about what species of shark the DNA is from.
	Cause and Effect • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.	Students will explain the cause and effect relationship between the banding patterns on the gel and their conclusion about what type of DNA was found in each sample.

Nature of Science

Scientific Knowledge is Based on Empirical Evidence

Science knowledge is based upon logical and conceptual connections between evidence and explanations.

- Science arguments are strengthened by multiple lines of evidence supporting a single explanation.

Scientific Investigations Use a Variety of Methods

- New technologies advance scientific knowledge.

Connections to Common Core State Standards

English Language Arts/Literacy	RST.11-12.1
RST.9-10.1	RST.11-12.3
RST.9-10.3	RST.11-12.4
RST.9-10.4	RST11-12.7
RST9-10.7	