

LabVenture! Experience

NGSS Standards

5 – Matter and Energy in Organisms and Ecosystems
 5 – Earth Systems
 MS – Interdependent Relationships in Ecosystems
 MS – Human Impact
 MS – Weather and Climate

Performance Expectations

The lessons and activities listed below are one part of helping students reach these performance expectations:

5-PS3-1 Use models to describe that energy in animals’ food (used for body repair, growth, motion, and to maintain body warmth) was once every from the sun.

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

MS-ESS3-4 Construct an argument supported by evidence for how increases in human populations and per-capita consumption of natural resources impacts Earth’s systems.

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

| Dimension | Name or NGSS code/citation | Matching student task or question taken directly from activity |
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| Science and Engineering Practice(s) | Developing and Using Models | Student work in teams and as a class to build a complex system model, showing the relationships between species in the Gulf of Maine. They use the model to predict changes that might occur based on different phenomena. |
| | Planning and Carrying Out Investigations | Students make observations and collect data and use as evidence to support their claims. |
| | Analyzing and Interpreting Data | As a class, students interpret scientific graphs to help explain their reasoning for why the lobster population is |

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| | <p>Constructing Explanations and Designing Solutions</p> <p>Engaging in Argument from Evidence</p> <p>Obtaining, Evaluating, and Communicating Information</p> | <p>increasing.</p> <p>Throughout the experience students collaborate to discuss the evidence and construct explanations in the form of video reports and a model.</p> <p>During the discussion, teams share their explanations for a given phenomenon and have the opportunity to critique and challenge other explanations using evidence.</p> <p>Throughout the experience students synthesize the information and data they collected or were provided with into written and oral formats.</p> |
| <p>Disciplinary Core Idea(s)</p> | <p>ESS3.D: Global Climate Change</p> <p>ESS3.C: Human Impacts on Earth Systems</p> <p>LS2.A: Interdependent Relationships in Ecosystems</p> | <p>Students explore the difference between weather and climate and how human actions are impacting the global climate. They apply this information to their model and think about how the Gulf of Maine will change if water gets warmer.</p> <p>Students learn how human actions, though fishing and climate change, affect different species in the Gulf of Maine and some of the ways that humans work to decrease negative impacts.</p> <p>Students build a model showing how cod, lobster, herring, copepods, and humans are all connected. They learn how changes in one population affect the ecosystem.</p> |

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| <p>Crosscutting Concept(s)</p> | <p>Cause and Effect</p> | <p>Students explore this concept in many ways from experiencing game based interdependent relationships, analyzing graphical depictions, and predicting effects based on a given cause.</p> |
| | <p>Systems and System Models</p> | <p>Throughout the station students work as a team to construct a model of a complex system, the Gulf of Maine. During the discussion the class builds one model together and use it to predict what might happen if there are changes in the Gulf of Maine. Additionally, students explore how the planktonic system is a subset of the larger Gulf of Maine ecosystem.</p> |
| | <p>Stability and Change</p> | <p>Students explore the relationships between 5 species in the Gulf of Maine and how changes in one species affect the stability of the ecosystem.</p> |
| | <p>Patterns</p> | <p>Students identify patterns in data, animal behavior, and relationships between species.</p> |
| | <p>Scale, Proportion and Quantity</p> | <p>Students use models to better understand systems on a microscopic scale, the planktonic system, to a very large scale, the Gulf of Maine ecosystem.</p> |

For alignment to Maine Learning Results please visit labventure.gmri.org/teachers/standards.aspx

LabVenture! Station: Climate Connections

NGSS Standard

5 – Matter and Energy in Organisms and Ecosystems

MS – Weather and Climate/ Human Impacts

Performance Expectations

The lessons and activities listed below are one part of helping students reach these performance expectations:

5-PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once every from the sun.

MS-ESS3-4 Construct an argument supported by evidence for how increase in human population and per-capita consumption of natural resources impact Earth's systems.

| Dimension | Name or NGSS code/citation | Matching student task or question taken directly from activity |
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| Science and Engineering Practice(s) | <p>Constructing Explanations and Designing Solutions</p> <p>Planning and Carrying Out Investigations</p> | <p>Students are asked to answer the question “What will happen if the Gulf of Maine gets warmer?” and provide evidence to support their claim.</p> <p>Students collect photo evidence of different species of plankton and the differences between copepods in warm water and cold water.</p> |
| Disciplinary Core Idea(s) | <p>ESS3.D: Global Climate Change</p> <p>LS2.A: Interdependent Relationships in Ecosystems</p> | <p>Students explore the difference between weather and climate and how the burning of fossil fuels is causing our climate to change. Students apply this information to determine what affects climate change might have on copepods.</p> <p>Through collecting photo evidence of phytoplankton and zooplankton, students learn how each species fits into the planktonic food web and the role the sun plays.</p> |
| Crosscutting Concept(s) | <p>Patterns</p> <p>Scale, Proportion, and Quantity</p> | <p>Students identify similarities and differences between warm and cold water copepods.</p> <p>Students observe the microscopic plankton system and explore how changes in this tiny system affect the larger Gulf of Maine system</p> |

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LabVenture! Station: Trawl to Table

| <p>NGSS Standard 5 – Earth Systems MS – Human Impacts</p> | | |
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| <p>Performance Expectations The lessons and activities listed below are one part of helping students reach these performance expectations:</p> <p>5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.</p> <p>MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment</p> | | |
| Dimension | Name or NGSS code/citation | Matching student task or question taken directly from activity |
| Science and Engineering Practice(s) | Analyzing and Interpreting Data | Students use bar graphs after each fishing trip to analyze their catch data and identify ways to improve their profit and environmental impact. |
| | Obtaining, Evaluating, and Communicating Information | Students review and share their findings in a video report. |
| Disciplinary Core Idea(s) | ESS3.C Human Impacts on Earth Systems | Students act as fishermen during a virtual fishing trip, making decisions that affect the type and size of fish they catch. Students explore how scientists and fishermen are working together to promote a healthy ecosystem. |
| Crosscutting Concept(s) | Cause and Effect | Students make decisions to change fishing grounds and/or buy new gear modifications. They see the effects of their choices in their catch and profit. |
| | Patterns | Through patterns students explore the relationship between catch variability and fishing ground location. |

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LabVenture! Station: Are We Farming Lobsters?

| <p>NGSS Standard 5 – Earth Systems MS – Human Impacts</p> | | |
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| <p>Performance Expectations The lessons and activities listed below are one part of helping students reach these performance expectations:</p> <p>5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.</p> <p>MS-ESS3-4 Construct an argument supported by evidence for how increases in human populations and per-capita consumption of natural resources impacts Earth’s systems.</p> | | |
| Dimension | Name or NGSS code/citation | Matching student task or question taken directly from activity |
| Science and Engineering Practices | Obtaining, Evaluating, and Communicating Information | Students review data collected by scientists, including videos and graphs. They then interpret and synthesize the information into a video report. |
| | Planning and Carry Out Investigations | Students record the tag number, measure carapace length, and determine sex of the lobster to help answer their question. |
| Disciplinary Core Idea | ESS3.C: Human Impacts on Earth Systems | Students explore the history of lobstering and try to figure out if humans are unintentionally farming lobsters. |
| Crosscutting Concepts | Patterns | Students watch videos of how lobsters interact with traps. (Do all the lobsters that enter the trap stay in the trap?) |
| | Cause and Effect | Students work towards answering the questions: Do lobster traps affect lobster populations? Are we farming lobsters with herring bait? |

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LabVenture! Station: Predator!

NGSS Standard

5 – Matter and Energy in Organisms and Ecosystems
MS – Interdependent Relationships in Ecosystems

Performance Expectations

The lessons and activities listed below are one part of helping students reach these performance expectations:

5-PS3-1 Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

| Dimension | Name or NGSS code/citation | Matching student task or question taken directly from activity |
|-------------------------------------|---|--|
| Science and Engineering Practice(s) | Constructing Explanations and Designing Solutions | Students use information and evidence collected throughout the station to explain how cod affect a lobsters' behavior. |
| | Planning and Carrying Out Investigations | Students collect video evidence of where lobsters prefer to live and interactions between cod and lobster. |
| Disciplinary Core Idea(s) | LS2.A: Interdependent Relationships in Ecosystems | Students explore the relationship between cod and lobster and how that affects lobsters' behavior. |
| Crosscutting Concept(s) | Stability and Change | Through playing a game, students investigate how the relationship between cod and lobster have affected/changed their populations. |
| | Cause and Effect | Students play a game to explore how changes in the cod population affect the lobster population and some of the mechanisms behind that change. |

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