# Trout in the Classroom Education Module
# New York State P-12 Science Learning Standards

| TIC Lesson | NYS Science Learning Standards* |
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| **Trout Lifecycle** | |
| **Connecting the Trout Life Cycle (ES, MS, HS)** | • 3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.<br>• MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.<br>• 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. |
| **Moving through the Trout Life Cycle (ES, MS, HS)** | • 3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.<br>• MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.<br>• 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. |
| **Trout Anatomy and Adaptations** | |
| **Adaptations of Trout Around the World (ES)** | • P-LS1-2. Plan and conduct an investigation to determine how familiar plants and/or animals use their external parts to help them survive in the environment.<br>• K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.<br>• 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.<br>• 3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.<br>• 3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.<br>• 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. |
| **Trout Organ Puzzle (MS, HS)** | • MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.<br>• MS-LS1-3. Construct an explanation supported by evidence for how the body is composed of interacting systems consisting of cells, tissues, and organs working together to maintain homeostasis.<br>• HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms |
| **Internal Trout Anatomy Collage (ES)** | • 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. |

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| Trout Environment and Stewardship | |
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| **Creating a Public Service Announcement for Trout Protection (ES, MS, HS)** | • K-ESS3-3: Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment.<br>• K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>• 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect Earth's<br>• resources and environment.<br>• MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.<br>• MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and protecting ecosystem stability.<br>• HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. |
| **Your Tank Is an Ecosystem! (ES, MS)** | • P-LS1-1. Observe familiar plants and animals (including humans) and describe what they need to survive.<br>• K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.<br>• K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.<br>• 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.<br>• MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem |
| **Climate Trouble for Trout in the Watershed (ES, MS, HS)** | • K-ESS3-3. Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment.<br>• 4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.<br>• 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.<br>• MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.<br>• MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.<br>• MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.<br>• 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.<br>• HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity<br>• 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. |



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| Trout Food Chain | |
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| **Trout Are Made of Trees (ES)** | • P-LS1-1. Observe familiar plants and animals (including humans) and describe what they need to survive.<br>• K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.<br>• 2-LS2-2. Develop a simple model that illustrates how plants and animals depend on each other for survival.<br>• 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.<br>• 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. |
| **Trophic Levels Relay Race (ES, MS, HS)** | • 2-LS2-2. Develop a simple model that illustrates how plants and animals depend on each other for survival.<br>• 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.<br>• 5-LS2-1. Develop a model to describe the movement of matter among plants (producers), animals (consumers), decomposers, and the environment.<br>• 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.<br>• MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms in a variety of ecosystems.<br>• MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.<br>• HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. |
| **Exploring Macroinvertebrates (MS, HS)** | • MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.<br>• 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. |
| **Go Macroinvertebrate! Card Game (MS, HS)** | • MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.<br>• HS-LS2-1. Use mathematical and/or computational representations to support explanations of biotic and abiotic factors that affect carrying capacity of ecosystems at different scales.<br>• 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. |



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