Unit 5: Interdependent Relationships in Ecosystems

Content Area: **Science**
Course(s): **Biology/Lab**
Time Period: **4th Marking Period**
Length: **10 Weeks**
Status: **Published**

Unit Overview

Biodiversity and animal behavior play a role in the survival of individuals and species in an ecosystem. Interactions among organisms influence the dynamics of ecosystems.

Transfer

Students will be able to independently use their learning to...

-Predict the likelihood of survival of an organism or species in a changing environment.

-Devise solutions in order to reduce the negative impact humans have on the environment.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that...

-Species behavior influences the chance of survival and reproduction.

-Species can adapt to changes in the environment.

-Humans have an impact on the environment and biodiversity.

Essential Questions

Students will keep considering...

-How do behaviors of organisms affect the stability of an ecosystem?

-Is everything that humans do bad for the environment?

Application of Knowledge and Skill

Students will know...

Students will know...

-Species behavior influences the chance of survival and reproduction.

-Species can adapt to changes in the environment.

-Humans have an impact on the environment and biodiversity.

Students will be skilled at...

Students will be skilled at...

-Recognizing the limiting factors that affect the carrying capacity of a population.

-Identifying symbiotic relationships among species within an ecosystem.

-Devise solutions to reduce the negative impact humans have on the environment.

Academic Vocabulary

Population
Population density
Dispersion
Birth rate
Death rate
Life expectancy
Age structure
Survivorship curves
Growth rate
Immigration
Emigration
Exponential model
Limiting factor
Logistic model
Carrying capacity
Density-independent factors
Density-dependent factors

Inbreeding

Symbiosis
Predation
Mimicry
Parasitism
Mutualism
Commensalism
Species richness
Species evenness
Species-area effect
Disturbances
Stability
Ecological succession
Pioneer species
Primary succession
Secondary succession

Climax community

Pollution

Greenhouse effect

Ozone layer

Global warming

Biological magnification

Learning Goal 1

Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

Proficiency Scale

SCI.HS-LS2-8	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

Target 1

SWBAT:

-Define population and its properties.

-Define the types of symbiotic relationships and give examples of each.

-Identify factors that affect the growth of a population.

-Identify how group behaviors (like flocking, schooling, herding) and cooperative behaviors (like hunting, migrating and swarming) influence a species' chances to survive and reproduce.

-Identify factors that will disrupt the interactions between species in a food web.

Learning Goal 2

Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Proficiency Scale

SCI.HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Target 1

SWBAT:

-Define limiting factors and explain how they affect carrying capacity.

-Predict the survival of the population by using population growth models.

-Use data to explain the growth of a population.

Learning Goal 3

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.

Proficiency Scale

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.

Target 1

SWBAT:

-Identify factors that result in changes to an ecosystem.

-Define succession.

-Distinguish between primary and secondary succession.

-Follow the path of succession from a pioneer species to a climax community.

Learning Goal 4

Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

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.

Target 1

SWBAT:

-Calculate the changes in population growth due to factors affecting the ecosystem.

-Graph data to represent populations and the factors that affect them.

Target 2

SWBAT:

-Calculate the changes in population growth due to human activities affecting the ecosystem.

-Graph data to represent changes in populations due to human activities.

Learning Goal 5

Design, evaluate, and refine a solution or simulation for reducing the impacts of human activities on the environment and biodiversity.

SCI.HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
9-12.HS-LS2-7.LS2.C.1	Moreover, anthropogenic changes (induced by human activity) in the environment— including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species.

Target 1

SWBAT:

-Identify ways human activities affect the environment and the survival of species.

-Consider possible solutions to reverse the adverse effects humans have on the environment.

Learning Goal 6

Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

[Proficiency Scale](#)

SCI.HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

Target 1

SWBAT:

-Define threatened and endangered species and give examples.

-Design a solution for a proposed problem related to threatened or endangered species.

Formative Assessment and Performance Opportunities

-Science notebook

-Homework assignments

-Classwork assignments

-Lab activities/explorations

-Quizzes, Tests, Projects

Summative Assessment

Common unit assessment aligned to the NJSLS and differentiated for varied learners.

Accommodations/Modifications

-504 accommodations

-IEP modifications

-Science notebook entries

-Videos, models, posters

- alternate form of assessment: Save the species project - student driven research and application of curriculum vocabulary

- graphing and data analysis of population demographics

Unit Resources

-Holt Modern Biology 2009

-Supplemental textbook materials

-Online resources

-Laptops

-Student Response Systems

-Lab materials

21st Century Life and Careers

CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when

CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP5.1	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP9.1	Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Interdisciplinary Connections

MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.

MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
LA.RST.11-12.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
MA.S-IC.A.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
LA.RST.11-12.7	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.
MA.S-IC.B.6	Evaluate reports based on data.
LA.RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LA.RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LA.WHST.11-12.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.9-10.7	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.