

# Unit 5: Interdependent Relationships in Ecosystems

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

## Unit Overview

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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

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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.

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

[http://www.authenticeducation.org/ae\\_bigideas/article.lasso?artid=60](http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60)

## Meaning

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## Understandings

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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**

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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**

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### **Students will know...**

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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...**

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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

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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**

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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**

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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.
  - Develop logical argument(s) based on evidence that supports the outcome of group behavior.
  - Relate symbiotic relationships to a species chances to survive and reproduce.
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  - -Identify how group behaviors (like flocking, schooling, herding) and cooperative behaviors (like hunting, migrating and swarming) influence a species' chances to survive and reproduce.
  - -Relate symbiotic relationships to a species chances to survive and reproduce.

## **Further Inquiry**

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How does predation on plants differ from predation on animals, in terms of the usual effect on the prey?

## **Learning Goal 2**

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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**

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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.
- Analyze data/graphs to determine the carrying capacity of a population.
- Provide examples of how limiting factors affect the carrying capacity of a population.

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- -Define limiting factors and explain how they affect carrying capacity.
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- -Provide examples of how limiting factors affect the carrying capacity of a population.
- -Use data to explain the growth of a population.

## **Further Inquiry**

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What type of limiting factor is a disease that is transmitted by parasites?

## **Learning Goal 3**

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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**

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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.
  - Explain a specific case of how succession has impacted an ecosystem.
  - Give an example of how human disturbances can affect community stability.
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  - -Distinguish between primary and secondary succession.
  - -Explain a specific case of how succession has impacted an ecosystem.
  - -Follow the path of succession from a pioneer species to a climax community.
  - -Give an example of how human disturbances can affect community stability.
  - -Identify factors that result in changes to an ecosystem.

### **Further Inquiry**

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"Communities are usually in a state of recovery from disturbance" Do you agree with this statement? Consider both animals and plants in your response.

### **Learning Goal 4**

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

## Proficiency Scale

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**

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SWBAT:

- Calculate the changes in population growth due to factors affecting the ecosystem.
- Graph data to represent populations and the factors that affect them.
- Analyze trends in population data and predict future growth.

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- -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**

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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.
- Analyze trends in population data and predict future human growth.

- -Analyze trends in population data and predict future human growth.
- -Calculate the changes in population growth due to human activities affecting the ecosystem.
- -Graph data to represent changes in populations due to human activities.

### **Further Inquiry**

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Explain why larger areas usually contain more species than smaller areas do.

### **Learning Goal 5**

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

## Proficiency Scale

SCI.HS-LS2-7

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

### **Target 1**

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SWBAT:

- Identify ways human activities affect the environment.
  - Consider possible solutions to reverse the adverse effects humans have on the environment.
  - Cite evidence(s) of how invasive species negatively impacts an ecosystem.
  - Relate human activities to biomagnification and its effects in the environment.
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  - -Consider possible solutions to reverse the adverse effects humans have on the environment.
  - -Identify ways human activities affect the environment.
  - -Relate human activities to biomagnification and its effects in the environment.

### **Further Inquiry**

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Explain why human growth limits/capacity cannot be easily determined.

### **Learning Goal 6**

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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**

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SWBAT:

- Define threatened and endangered species and give examples.
- Design a solution for a proposed problem related to threatened or endangered species.



-Investigate a real life species conservation plan and critique its success/flaws.

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- -Design a solution for a proposed problem related to threatened or endangered species.
- -Investigate a real life species conservation plan and critique its success/flaws.

### **Further Inquiry**

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Describe one measure Williamstown could do to reduce human impact on environment.

### **Formative Assessment and Performance Opportunities**

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-Science notebook

-Homework assignments

-Classwork assignments

-Lab activities/explorations

-Quizzes, Tests, Projects

-Unit Test Open-ended Response

### **Summative Assessment**

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

Common Assessment is administered on LinkIt.

### **Accommodations/Modifications**

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-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**

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- Holt Modern Biology 2009
- Supplemental textbook materials
- Online resources
- Laptops
- Student Response Systems
- Lab materials
- POGIL: Activities for HS Biology

## **21st Century Life and Careers**

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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 it is appropriate to apply the use of an academic skill in a workplace situation.
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.