

**UNIT OVERVIEW**

STAGE ONE: Identify Desired Results			
Established Goals/ Standards		Long-Term Transfer Goal	
		<i>At the end of this unit, students will use what they have learned to independently... take an activist role in their community in order to protect the environment.</i>	
		Meaning	
Perf Ind 1.1	Explain how diversity of populations within ecosystems relates to the stability of ecosystems	Enduring Understandings <i>Students will understand that...</i> <ul style="list-style-type: none"> <li>• A community of organisms interacts with the abiotic environment to form ecosystems</li> <li>• Ecosystems are complex, but it is possible to analyze them</li> <li>• Populations are limited in size by the amount of available resources</li> <li>• Ecosystems can be modified by human actions</li> <li>• Human actions follow from decisions, which are made within a cultural context</li> </ul>	Essential Questions <i>Students will consider such questions as...</i> How do relationships impact those involved?
1.1a	Populations can be categorized by the function they serve. Food webs identify the relationships among producers, consumers, and decomposers carrying out either autotrophic or heterotrophic nutrition.	Acquisition	
1.1b	An ecosystem is shaped by the nonliving environment as well as its interacting species. The world contains a wide diversity of physical conditions, which creates a variety of environments.		
1.1c	In all environments, organisms compete for vital resources. The linked and changing interactions of populations and the environment compose the total		
		What knowledge will students learn as part of this unit? <ul style="list-style-type: none"> <li>• <i>Interactions among organisms</i></li> <li>• <i>Limiting factors</i></li> <li>• <i>Carrying capacity</i></li> <li>• <i>Population growth</i></li> <li>• <i>Exponential growth</i></li> <li>• <i>Logistic growth</i></li> <li>• <i>Population dynamics</i></li> <li>• <i>Ecosystems change across time</i></li> <li>• <i>Global interdependence</i></li> <li>• <i>Ecosystem complexity</i></li> <li>• <i>Impacts of human activities on ecosystems</i></li> <li>• <i>Impact of human decision-making on ecosystems</i></li> <li>• <i>Interaction of science and society</i></li> <li>• <i>Contribution of science to public policy</i></li> </ul>	What skills will students learn as part of this unit? <ul style="list-style-type: none"> <li>• <i>Systems analysis as a tool for analyzing complex interactions</i></li> <li>• <i>Analyzing graphs</i></li> </ul>

	ecosystem.		
1.1d	The interdependence of organisms in an established ecosystem often results in approximate stability over hundreds and thousands of years. For example, as one population increases, it is held in check by one or more environmental factors or another species.		
1.1e	Ecosystems, like many other complex systems, tend to show cyclic changes around a state of approximate equilibrium.		
1.1f	Every population is linked, directly or indirectly, with many others in an ecosystem. Disruptions in the numbers and types of species and environmental changes can upset ecosystem stability.		
Key Idea 6	Plants and animals depend on each other and their physical environment.		
Perf Ind 6.1	Explain factors that limit growth of individuals and populations.		
6.1d	The number of organisms any		

	habitat can support (carrying capacity) is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle the residue of dead organisms through the activities of bacteria and fungi.		
6.1e	In any particular environment, the growth and survival of organisms depend on the physical conditions including light intensity, temperature range, mineral availability, soil/rock type, and relative acidity (pH).		
6.1f	Living organisms have the capacity to produce populations of unlimited size, but environments and resources are finite. This has profound effects on the interactions among organisms.		
6.1g	Relationships between organisms may be negative, neutral, or positive. Some organisms may interact with one another in several		

	ways. They may be in a producer/consumer, predator/prey, or parasite/host relationship; or one organism may cause disease in, scavenge, or decompose another		
Perf Ind 6.2	Explain the importance of preserving diversity of species and habitats.		
6.2a (1st half)	As a result of evolutionary processes, there is a diversity of organisms and roles in ecosystems. This diversity of species increases the chance that at least some will survive in the face of large environmental changes. Biodiversity increases the stability of the ecosystem.		
Perf Ind 6.3	Explain how the living and nonliving environments change over time and respond to disturbances		
6.3a	The interrelationships and interdependencies of organisms affect the development of stable ecosystems		

6.3b	Through ecological succession, all ecosystems progress through a sequence of changes during which one ecological community modifies the environment, making it more suitable for another community. These long-term gradual changes result in the community reaching a point of stability that can last for hundreds or thousands of years.		
6.3c	A stable ecosystem can be altered, either rapidly or slowly, through the activities of organisms (including humans), or through climatic changes or natural disasters. The altered ecosystem can usually recover through gradual changes back to a point of long term stability.		
7.2b (invasive species)	When humans alter ecosystems either by adding or removing specific organisms, serious consequences may result. For		

	example, planting large expanses of one crop reduces the biodiversity of the area.		
Perf Ind 7.1	Describe the range of interrelationships of humans with the living and nonliving environment		
7.1a	The Earth has finite resources; increasing human consumption of resources places stress on the natural processes that renew some resources and deplete those resources that cannot be renewed.		
7.1b	Natural ecosystems provide an array of basic processes that affect humans. Those processes include but are not limited to: maintenance of the quality of the atmosphere, generation of soils, control of the water cycle, removal of wastes, energy flow, and recycling of nutrients. Humans are changing many of these basic processes and the changes may be detrimental		
7.1c	Human beings are part of the		

	<p>Earth's ecosystems. Human activities can, deliberately or inadvertently, alter the equilibrium in ecosystems. Humans modify ecosystems as a result of population growth, consumption, and technology. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems may be irreversibly affected.</p>		
Perf Ind 7.2	<p>Explain the impact of technological development and growth in the human population on the living and nonliving environment.</p>		
7.2a	<p>Human activities that degrade ecosystems result in a loss of diversity of the living and nonliving environment. For example, the influence of humans on other organisms occurs through land use and pollution.</p> <p>Land use</p>		

	decreases the space and resources available to other species, and pollution changes the chemical composition of air, soil, and water.		
7.2c	Industrialization brings an increased demand for and use of energy and other resources including fossil and nuclear fuels. This usage can have positive and negative effects on humans and ecosystems.		
Perf Ind 7.3	Explain how individual choices and societal actions can contribute to improving the environment		
7.3a	Societies must decide on proposals which involve the introduction of new technologies. Individuals need to make decisions which will assess risks, costs, benefits, and trade-offs.		
7.3b	The decisions of one generation both provide and limit the range of possibilities open to the next generation.		
6.2b (bridge from Ecol	Biodiversity also ensures the availability of a rich variety of genetic material		



ogist)	that may lead to future agricultural or medical discoveries with significant value to humankind. As diversity is lost, potential sources of these materials may be lost with it.		
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STAGE TWO: Determine Acceptable Evidence	
	Assessment Evidence
<p>Criteria to assess understanding: <i>(This is used to build the scoring tool.)</i></p> <p><b>Concept: Showing understanding of the big picture in this chapter:</b> Letter provides evidence that the writer clearly understands the role that complex interactions and interdependence play in the Tri-Lakes ecosystem. Writer includes strong references to systems analysis techniques to support his or her analysis of the Tri-Lakes problem.</p> <p><b>Explanations for key ecological interactions influencing the Tri-Lakes region, including specific evidence to support ideas:</b> Letter explicitly states 2 or more major problems identified in the region and proposes 2 or 3 well-reasoned explanations for the</p>	<p>Performance Task focused on Transfer:</p> <p>Ch. 16- "Tri-Lakes: Public Policy" p. 815 Letter to the Tri-Lakes association describing how the components in the Tri-Lakes system interact under normal conditions; state best explanation for the changes that have taken place; recommend policy decisions</p> <ul style="list-style-type: none"> <li>● Discuss questions with your team: <ul style="list-style-type: none"> <li>○ Who are the stakeholders?</li> <li>○ What should the community do about the declining bass population? (thinking about management options from ch. 15 and 16)</li> </ul> </li> <li>● Discuss rubric with partner</li> <li>● Develop a response to the letter from the Tri-Lakes Association, including <ul style="list-style-type: none"> <li>○ Showing how complex interactions and interdependence are evident in the ecosystem</li> <li>○ Explaining how a systems approach can assist in analyzing the problems</li> <li>○ Identifying and explaining the causes of at least 2 problems in the ecosystem</li> <li>○ Supporting your explanation with specific observations from lab work and data packet</li> <li>○ Identifying missing info that would be valuable to the continued analysis of the problem or would better identify the initial causes of the problem</li> <li>○ Showing an understanding of the different viewpoints within the community about how to manage the ecosystem</li> <li>○ Specific policy recommendations based on your findings</li> </ul> </li> <li>● Exchange letters with another student and evaluate based on the rubric provide at least 4 specific constructive comments</li> <li>● Revise letter</li> </ul>

interactions that are leading to the problems. Letter explains logical connections between at least 1 specific piece of evidence from lab work and 3 or more specific pieces of evidence from the data packet to support the writer's line of reasoning. Letter clearly states at least 2 additional pieces of evidence the writer would like to know to better analyze the situation, and it specifically explains why that information would be valuable.

**Policies: Using evidence and stakeholder perspectives to arrive at a policy recommendation:**

Writer's description of the Tri-Lakes situation uses multiple examples to explain clearly the different viewpoints community members would likely hold about the problems. Writer makes specific policy recommendations and backs them up with sound reasoning.

**Presentation:** Letter is easy to read. Grammar and punctuation are used correctly, making it easy to understand what

- Class discussion; reflect on lab investigations and write about changes in thinking after the activity
- Analysis:
  - Write a paragraph summarizing the difference between an explanation based on a single analysis and one based on a combination of related analyses; add 1-2 sentences explaining how this difference should affect the way you interpret scientific studies reported in the news
  - Write a general statement that assesses our ability to predict the consequences when humans introduce abiotic or biotic components into the environment; provide examples and reasons

**Other Assessment Evidence:**

Ch. 15: "Critters and interdependence"--create a story that describes interactions among various organisms and resources in a particular habitat (your critter, classmates' critters, and other native organisms)

- Identify your habitat card from ch. 3 (in science notebook)
- Watch the video "Ecosystems of the earth" and:
  - Record the name of each ecosystem
  - List at least 4 limiting factors in each ecosystem (biotic and abiotic)
- Class discussion summarizing interactions and resources in each ecosystem
- Join with classmates that had the same ecosystem card
- Discuss rubric with teammates
- Describe your critter to your teammates
- Imagine that you, your teammates, and each critter are living together in the assigned habitat--brainstorm the following:
  - Possible interactions between organisms
  - Biotic and abiotic resources that might exist
  - Ways the different critters might be interdependent
  - Adaptations that might evolve over time as the critters interact
  - How humans from a variety of cultures might interact with other organisms
- Individually write a story featuring some of the ideas from your team
- Analysis:
  - Explain the most challenging part of writing the story
  - Explain which major concept in the chapter was most difficult to incorporate into the story
  - Explain whether the interactions and interdependence with other organisms or the limiting factors/carrying capacity was

is meant.	<p>easier to write about</p> <ul style="list-style-type: none"><li>○ What adaptations did you consider adding to your critter? Explain why you did or did not add them</li></ul>
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T, M, A (Code for Transfer, Meaning Making and Acquisition)	STAGE THREE: Plan Learning Experiences	
	Learning Events:	Evidence of learning: (formative assessment)