DECODING THE TONGASS NATIONAL FOREST FOOD WEB

8th-10th Grade Discussion Guide

SCIENCE CATEGORIES
Life Science

TIMEFRAME
Two, 45-minute sessions

UNIT THEME
Aquatic Science

MATERIALS
Internet access to Food Webs- In Aquatic Science Tongass Forest Food Webs classroom video

Online research- https://www.fs.usda.gov/tongass/

Food Web- Word Bank Worksheet (included in this PDF)

TOPICS
Food Chains and Food Webs

OBJECTIVES

Content- Students will be able to define the key lifeforms that make up the different levels in the Tongass National Forest food web.

Learner- Students will use video, online research and classroom discussion in defining the food web.

Process- Students will work in small groups to process new information and use evidence to come to conclusions.

SUMMARY

Students will research and define the biotic and abiotic energy flow and lifeforms in the Tongass National Forest ecosystem. Students will develop an understanding and appreciation for our National Forests and the role they play in a healthy environment.

OVERVIEW

America's National Forests from Maine to Alaska, and most places in between, offer a chance to explore and understand a huge variety of natural ecosystems. And whether it's in a temperate coastal rainforest or a desert environment, every National Forest is the perfect place for either learning online and in person about ecosystems and the complex food webs that support them. Many food webs within an ecosystem have one or two keystone species that are a dominant point for energy flow within the system, or have major impacts on the system. In some National Forests in our Eastern States for instance, the white-tailed deer is the noted keystone species that eats plants, sometimes way too many that affect the entire ecosystem.

The energy flow in most food webs (both terrestrial or aquatic) begins when the photosynthetic activity of the plants converts solar energy into chemical energy in the form of carbohydrates. In ocean water, Phytoplankton are actually microscopic plants that play a huge role in the marine food web. Like plants on land, phytoplankton perform photosynthesis to convert the sun's rays into energy to support them, and they take in carbon dioxide and produce oxygen. On land, plant leaves that are periodically dropped also contribute to the energy transfer of carbon and nutrient within a food web. Colonies of bacteria decompose the leaf matter, releasing energy that is picked up by other primary level consumers. These often-overlooked processes form the base of many food pyramids.

SESSION 1:

Before watching the classroom video or reading the website information, ask students what they know about food webs within a forest. Also ask students how many have actually visited National Forests and what they know about food webs in those forests.

Print and distribute the **Food Web - Word Bank Worksheet** (in this PDF). Instruct students to note organisms from the Word Bank at the bottom while watching the Tongass Food Web video. After viewing the video, review and discuss what Word Bank organisms they felt belonged in what level in the Alaskan coastal rainforest food web pyramid. Also discuss how both terrestrial and aquatic systems interrelate there.

Next, divide the class into small groups of two or three students. Have student groups conduct online research on each of the words in the Word Bank and place them in the appropriate level in the Tongass National Forest food pyramid. Also suggest Google searches for organisms and their trophic strategies in Alaska's coastal environments. Assign one group to focus exclusively on Krill and their role in the food web.

SESSION 2: CLASSROOM DISCUSSION

Have each group of students present their findings and the supporting reasons for level placement of some of the key organisms. After all the groups have presented their findings, lead a group discussion on the transfer of energy within the Tongass National Forest ecosystem. (Optional: lead a group discussion on how energy flows in the ecosystem, including from ocean, to fresh water, to land.) Also contrast and compare the Tongass National Forest ecosystem with that of a National Forest near you.

Conclude the discussion with a sampling of students who might be interested or have the opportunity to discover first-hand a food web or aquatic ecosystem while being an angler.

Assessment- Students will be informally assessed based on their participation during class presentations and discussions.

Students can be formally assessed on meeting the formal learning objectives on how thoroughly students completed their **Food Web - Word Bank Worksheet.**

The following National Common Core Standards can be met teaching;

NATIONAL FOREST FOOD WEB STANDARDS

COMMON CORE STANDARDS:

CCSS.ELA-LITERACY.L.8.3   Use knowledge of language and its conventions when writing, speaking, reading, or listening.

CCSS.ELA-LITERACY.L.8.4   Determine or clarify the meaning of unknown and multiple-meaning words or phrases based on grade 8 reading and content, choosing flexibly from a range of strategies.

CCSS.ELA-LITERACY.RI.8.1   Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.

CCSS.ELA-LITERACY.RST.6-8.1   Cite specific textual evidence to support analysis of science and technical texts.

CCSS.ELA-LITERACY.RST.6-8.2   Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

CCSS.ELA-LITERACY.RST.6-8.4   Determine the meaning of symbols, key terms, and other domain- specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

CCSS.ELA-LITERACY.SL.8.1   Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others; ideas and expressing their own clearly.

CCSS.ELA-LITERACY.SL.8.4   Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

CCSS.ELA-LITERACY.SL.8.5   Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

CCSS.ELA-LITERACY.SL.8.6   Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

CCSS.ELA-LITERACY.W.8.2   Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

CCSS.ELA-LITERACY.W.8.4   Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-LITERACY.W.8.8   Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CCSS.ELA-LITERACY.W.8.9   Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCSS.ELA-LITERACY.WHST.6-8.1   Write arguments focused on discipline-specific content.

CCSS.ELA-LITERACY.WHST.6-8.4   Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-LITERACY.WHST.6-8.8   Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CCSS.ELA-LITERACY.WHST.6-8.9   Draw evidence from informational texts to support analysis, reflection, and research.

|	
CCSS.ELA-LITERACY.L.9-10.4	Determine or clarify the meaning of unknown and multiple- meaning words and phrases based on grades 9-10 reading and content, choosing flexibly from a range of strategies.
CCSS.ELA-LITERACY.RI.9-10.1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
CCSS.ELA-LITERACY.RST.9-10.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
CCSS.ELA-LITERACY.RST.9-10.2	Determine the central ideas or conclusions of a text; trace the text explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
CCSS.ELA-LITERACY.RST.9-10.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
CCSS.ELA-LITERACY.SL.9-10.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
CCSS.ELA-LITERACY.SL.9-10.2	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
CCSS.ELA-LITERACY.SL.9-10.3	Evaluate a speakers point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.
CCSS.ELA-LITERACY.SL.9-10.4	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
CCSS.ELA-LITERACY.SL.9-10.5	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
CCSS.ELA-LITERACY.W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
CCSS.ELA-LITERACY.W.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CCSS.ELA-LITERACY.W.9-10.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
CCSS.ELA-LITERACY.WHST.9-10.1	Write arguments focused on discipline-specific content.
CCSS.ELA-LITERACY.WHST.9-10.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
CCSS.ELA-LITERACY.WHST.9-10.9	Draw evidence from informational texts to support analysis, reflection, and research.

NEXT GENERATION SCIENCE STANDARDS

MS-LS2-2.

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. [Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]

MS-LS2-3.

Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. [Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.]

MS-LS2-4.

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

HS-LS2-3.

Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. [Clarification Statement: Emphasis is on conceptual understanding of the role of aerobic and anaerobic respiration in different environments.]

HS-LS2-5.

Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. [Clarification Statement: Examples of models could include simulations and mathematical models.] [Assessment Boundary: Assessment does not include the specific chemical steps of photosynthesis and respiration.]

Tongass National Forest Food Web

Research the "Word Bank" below and determine where each of the "factors" and organims belong in the food pyramid diagram below. List terrestrial or land on the left side, aquatic on the right.
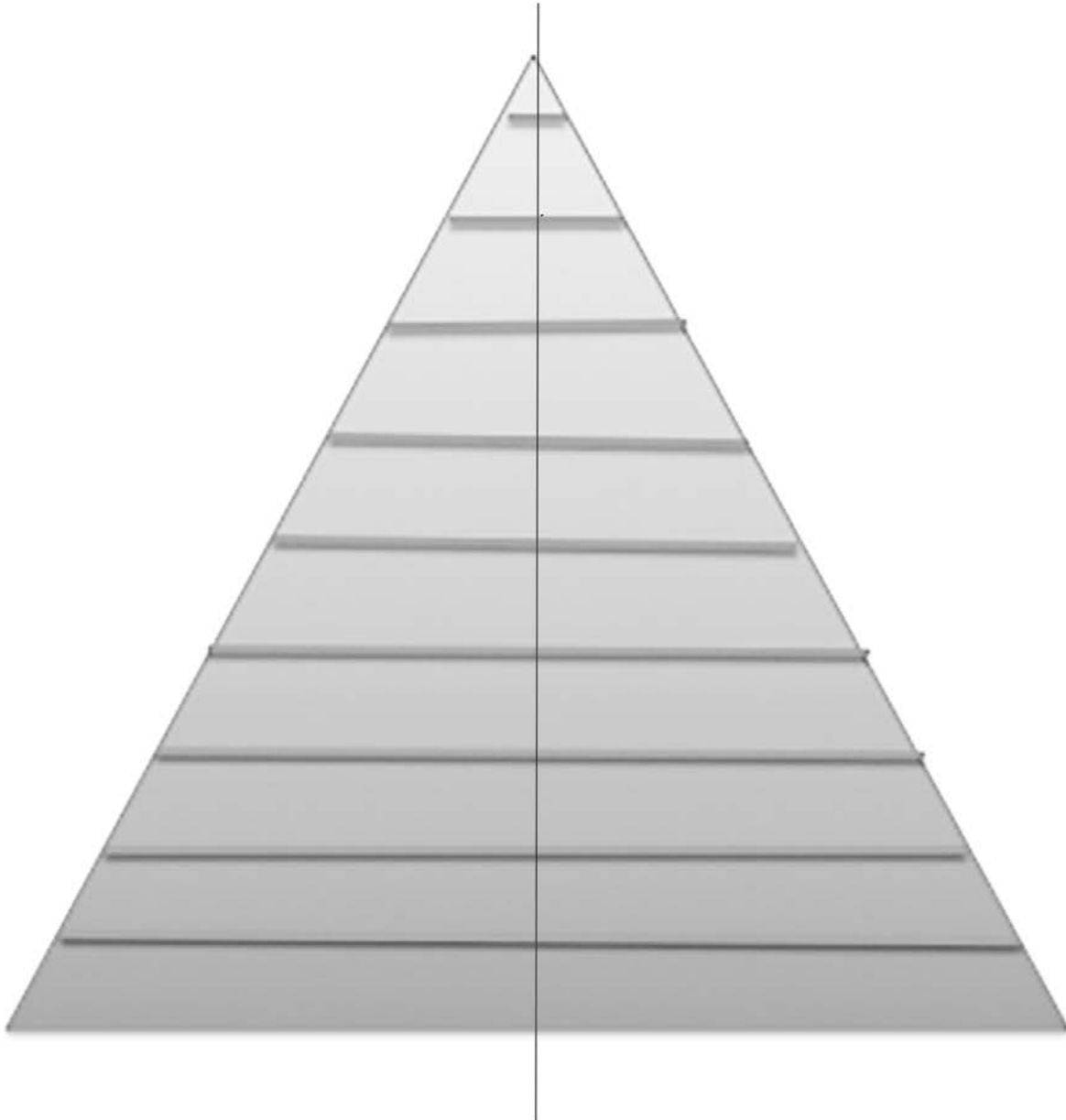
Word Bank: photosynthesis, brown bears, algea, Krill, whales, solar energy, chemical energy, salmon, minnows, phytoplankton, zooplankton, fresh water, eagles, human angler, insects, trees, trout, aquatic plants, black bears, ocean.