

**Integrated/Coordinated Science One
Biology - Content Standards**

Ecology

6. Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept:

- a. *Students know* biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats.
- b. *Students know* how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.
- c. *Students know* how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death.
- d. *Students know* how water, carbon, and nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles through photosynthesis and respiration.
- e. *Students know* a vital part of an ecosystem is the stability of its producers and decomposers.
- f. *Students know* at each link in a food web some energy is stored in newly made structures but much energy is dissipated into the environment as heat. This dissipation may be represented in an energy pyramid.
- g. **Students know* how to distinguish between the accommodation of an individual organism to its environment and the gradual adaptation of a lineage of organisms through genetic change.

Integrated Coordinated Science One Biology – Process Standards

Investigation and Experimentation

- 1. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop their own questions and perform investigations. Students will:**
 - a. Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.
 - b. Identify and communicate sources of unavoidable experimental error.
 - c. Identify possible reasons for inconsistent results, such as sources of error and uncontrolled conditions.
 - d. Formulate explanations by using logic and evidence.
 - e. ~~Solve scientific problems by using quadratic equations and simple trigonometric, exponential, and logarithmic functions.~~
 - f. Distinguish between hypothesis and theory as scientific terms.
 - g. Recognize the usefulness and limitations of models and theories as scientific representations of reality.
 - h. Read and interpret topographic and geologic maps.
 - i. Analyze the locations, sequences, or time intervals that are characteristic of natural phenomena (e.g., relative ages of rocks, locations of planets over time, and succession of species in an ecosystem).
 - j. Recognize the issues of statistical variability and the need for controlled tests.
 - k. Recognize the cumulative nature of scientific evidence.
 - l. Analyze situations and solve problems that require combining and applying concepts from more than one area of science.
 - m. Investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings. Examples of issues include irradiation of food, cloning of animals by somatic cell nuclear transfer, choice of energy sources, and land and water use decisions in California.
 - n. Know that when an observation does not agree with an accepted scientific theory, the observation is sometimes mistaken or fraudulent (e.g., the Piltdown Man fossil or unidentified flying objects) and that the theory is sometimes wrong (e.g., the Ptolemaic model of the movement of the Sun, Moon, and planets).

Integrated/Coordinated Science One – Biology

Analyzed Standards 6a, 6e, 6f, 6c, 6b, 6d	Instructional Activities, Resources, and Performance Tasks	Notes and Integrated Connections	Materials (<u>underlined are in LAUSD kit</u>)
Performance Task: Create an Eco-traveler Guide to a National Park. See next section for details.			
<p>6a.</p> <ul style="list-style-type: none"> Define biodiversity Describe why biodiversity is important in an ecosystem. 	<p>Chapter 9 – A Vote for Ecology; pp. 502-576</p> <p><u>Activity 1 - Diversity in Living Things; pp. 502-513</u></p> <ul style="list-style-type: none"> What Do You Think?; p. 502 For You to Do; pp. 502-506 Bio Talk; <i>Biodiversity</i>; pp. 506-512 Biology to Go; p. 513 Inquiring Further; p. 513 Activity Debrief <p>Supplemental Activities/Resources:</p> <p>Case Studies:</p> <ul style="list-style-type: none"> Galapagos Islands (El Nino and Bird Beaks) California Drought - Bark Beetles http://ublib.buffalo.edu/libraries/projects/cases/case.html <p>Field Trips:</p> <ul style="list-style-type: none"> Zoo Aquarium Botanical Garden <p>Speakers:</p> <ul style="list-style-type: none"> El Niño-related presentations State Park Ranger - Fire ecology 	<p>Biology at Work; p. 576</p> <p>Chem. 7b. Physics 3f., I & E 1d</p>	<p><u>Activity 1</u></p> <ul style="list-style-type: none"> Stereomicroscope or 10x hand lens Watch glass Dropping pipette Compound microscope <u>#2 paintbrush</u> <u>Prepared slide of longitudinal section of hydra</u> <u>1 or 2 live hydra</u> <u>Daphnia culture</u> <u>1 OR 2 live planaria</u> Small piece of raw liver <u>Prepared slide of cross section of planaria</u> Paper towels <u>1 or 2 earthworms</u> <u>Box containing damp soil</u> <u>Prepared slide of cross section of earthworm</u> Shallow box or pan Small pieces of fruit or lettuce <u>1 live land hermit crab</u> Aquarium/clear plastic box Live frog

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<p><u>6e.</u></p> <ul style="list-style-type: none"> Distinguish the roles of producers, consumers, and decomposers in an ecosystem. Describe the importance of the interactions of producers, consumers, and decomposers in keeping a balance in an ecosystem <p><u>6f.</u></p> <ul style="list-style-type: none"> Use an energy pyramid to describe the transfer and dissipation of energy through every level of a food web. 	<p><u>Activity 2 – Who Eats Whom?; pp. 514-521</u></p> <ul style="list-style-type: none"> What Do You Think?; p. 514 For You to Do; pp. 514-516 Bio Talk; <i>Food Chains and Webs</i>; pp. 516-520 Biology to Go; p. 521 Inquiring Further; p. 521 Activity Debrief <p>Supplemental Activities/Resources: Case Studies</p> <ul style="list-style-type: none"> MWD Delta Smelt Issue <u>Silent Spring</u> - Rachel Carson http://ublib.buffalo.edu/libraries/projects/cases/case.html <p><u>Activity 3 – Energy Flow in Ecosystems; pp. 522-528</u></p> <ul style="list-style-type: none"> What Do You Think?; p. 522 For You to Do; pp. 522-524 Bio Talk; <i>Pyramids of Mass and Energy</i>; pp. 524-527 Biology to Go; pp. 527-528 Inquiring Further; p. 528 Activity Debrief <p>Supplemental Activities/Resources</p> <ul style="list-style-type: none"> M and M Energy Flow Lab ICS Energy Flow with water 	<p>Chem. 7b. Physics 3f.,</p> <p>Bio 6a. Earth 9b, c., 3e.</p> <p>Alert</p> <ul style="list-style-type: none"> Revisit/reread pp 506-513; “Bio Talk” Inquiring Further; p 513; “Passenger Pigeon Extinction” 	<p><u>Activity 2</u></p> <ul style="list-style-type: none"> <u>Ball of string about 35 m long</u> Plastic name tag holders (one per student) <p><u>Activity 3</u></p> <ul style="list-style-type: none"> large containers (1000 L) <u>thermometers</u> ice stirring rod graph paper

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<p>6c.</p> <ul style="list-style-type: none"> Compare how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, death, and emigration. <p>6b.</p> <ul style="list-style-type: none"> Recognize, compare, and analyze patterns of change in an ecosystem with regard to: 1) Abiotic, non-human factors, 2) Biotic non-human factors, and 3) Human impact 	<p><u>Activity 4 – Factors Affecting Population Size; pp. 529-537</u></p> <ul style="list-style-type: none"> What Do You Think?; p. 529 For You to Do; pp. 529-532 Bio Talk; pp. <i>Changing Population Sizes</i>; pp. 533-536 Biology to Go; p. 537 Inquiring Further; p.537 Activity Debrief <p>Supplemental Activities/Resources:</p> <ul style="list-style-type: none"> Cemetery Census Computer Population Simulations Human Populations—S and S Tragedy of the Commons <p>Case Study:</p> <ul style="list-style-type: none"> Population Bomb - Dr. Paul Erlich http://ublib.buffalo.edu/libraries/projects/cases/case.html <p><u>Activity 5 – Competition among Organisms; pp. 538-545</u></p> <ul style="list-style-type: none"> What Do You Think?; p. 538 For You to Do; pp. 538-540 Bio Talk; Plants and Animals Compete for Resources; pp. 541-543 Biology to Go; p. 544 Inquiring Further; p. 545 Activity Debrief 	<p>Earth 7a-d. 9c., Chem. 5a, c</p>	<p><u>Activity 4</u></p> <ul style="list-style-type: none"> Calculator Graph paper <p><u>Activity 5</u></p> <ul style="list-style-type: none"> Milk container bases (or similar containers) <u>Potting soil</u> <u>Cress seeds</u> Lettuce seeds Variety of other seeds (student’s choice) Small watering can or suitable substitute Ruler

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	<p>Supplemental Activities/Resources:</p> <ul style="list-style-type: none"> • Oh Deer (resources only)—Project Wild • Biology Teacher Magazine-Introduced Species • Stream Study over time—temp, nitrogen and algae • Sample letters to State Representatives on Issues <p>Case Studies:</p> <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • <u>Arondo donax</u> • Bird Flu • California Condor • California Sea Otters/Urchins/Kelp Forests • Hawaii Invasive Ginger • HIV/Flu • Mongoose of Hawaii • Orcas, Sea Lions, Otters • Passenger Pigeon </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • Polar Bears • Rapa Nui (Easter Island) • Reintroduction of Wolves of Yellowstone • Russian Thistle • Santa Cruz Island Foxes • Tamarisk • West Nile </td> </tr> </table> <p>Readings</p> <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • Edward Abbey • Jared Diamond </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • John Muir • <u>The Lorax</u> - Dr. Seuss </td> </tr> </table> <p>Speakers:</p> <ul style="list-style-type: none"> • College Research Profs/Grad. Student • Fish and Game Warden • Park Ranger 	<ul style="list-style-type: none"> • <u>Arondo donax</u> • Bird Flu • California Condor • California Sea Otters/Urchins/Kelp Forests • Hawaii Invasive Ginger • HIV/Flu • Mongoose of Hawaii • Orcas, Sea Lions, Otters • Passenger Pigeon 	<ul style="list-style-type: none"> • Polar Bears • Rapa Nui (Easter Island) • Reintroduction of Wolves of Yellowstone • Russian Thistle • Santa Cruz Island Foxes • Tamarisk • West Nile 	<ul style="list-style-type: none"> • Edward Abbey • Jared Diamond 	<ul style="list-style-type: none"> • John Muir • <u>The Lorax</u> - Dr. Seuss 		
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	<p>Activity 8 – Photosynthesis, Respiration and the Carbon Cycle; pp. 561-566</p> <ul style="list-style-type: none"> • What Do You Think?; p. 561 • For You to Do; pp. 561-563 • Bio Talk; <i>The Carbon Cycle</i>; pp. 563-565 • Biology to Go; p. 566 • Inquiring Further; p. 566 • Activity Debrief 	<p>Earth 7a-d. Chem. 5a, c.</p> <p>NOTE: Activity 7, 8 & 9 replaced with <i>eco-column</i> p. 560 TE</p>	<p>Activity 8</p> <ul style="list-style-type: none"> • Piece of plastic tubing • 0.1 mL pipette • Water tank or wide mouthed jar made of plastic or glass • Branch of Coleus or Zebrina • Sharp knife or garden scissors • Paper towels • Iron clamp • Graphing papers • Distilled water • Pond water with algae • Law fertilizer • Plastic wrap • Glass marker • Paper towel • Filter • Timer • Ruler • Calculator • 1-L jars • Soap • Detergent • papers • Funnels • Scale gloves • Goggles • Apron

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	<p>Activity 9 – <i>The Nitrogen and Phosphorus Cycles</i>; pp. 567-576</p> <ul style="list-style-type: none"> • What Do You Think?; p. 567 • For You to Do; pp. 567-568 • Bio Talk; <i>The Nitrogen Cycle</i>; pp. 569-574 • Biology to Go; p. 575 • Inquiring Further; p. 575 • Activity Debrief <p>Supplemental Activities/Resources</p> <ul style="list-style-type: none"> • CA Water • MWD-Student Water Debate Forum • WEFT-Water Reclamation Lab • Water Quality Analysis Using Winkler and Probes • TOPS • Project Learning Tree-Life as a Water Drop • Water Dance • Cadillac Desert-Video Series (CA Water Rights) • Seven States of CA - Earth Science Standards/Geography 	<p>Earth 7a-d. Chem. 5a, c.,</p> <p>NOTE: Activity 7, 8 & 9 replaced with <i>eco-column</i> p. 560 TE</p>	<p>Activity 9</p> <ul style="list-style-type: none"> • 3 1-L jars • 2.25 L distilled water • 30 mL pond water with algae (10 mL per jar) • 45 g lawn fertilizer • 45 g detergent • plastic wrap • glass marker • 3 filter papers • 3 funnels • scale • gloves • goggles • apron • soap • paper towels