

Connections between *Ricky*' Atlas and Next Generation Science Standards
THIRD GRADE

(Blue type = Science & Engineering Practices; Red type=Disciplinary Core; Green type= Crosscutting Concepts and Connections to ELA/Literacy and Mathematics)

3LS4 *Biological Evolution: Unity and Diversity*

Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. (3-LS4-1)

Analyzing and Interpreting Data:

Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)

3A. Students read Chp 4 as an introduction to fossils at the John Day Fossil Beds. At the monument website, www.nps.gov/joda/learn/nature/fossils.htm students examine illustrations of fossils from several geological strata, then draw a timeline of Cenozoic fossils.

Scale, Proportion and Quantity (3-LS4-1)

Observable phenomena exist from very short to very long time periods.

3B. Students review the time scales Ricky talks about in the book (especially Chp 8), then decide how these time scales might be graphed. This may become a class effort in scaling and graphing very long time scales.

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

Ecosystem Dynamics, Functioning and Resilience (LS2.C)

When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move

3C. 1.:Students examine Ellie's graph of the rain shadow (Chp 3), discuss why the kinds of plants change across the plateau, then draw their own diagram of plant distribution in a rain

into transformed environments, and some die.

Evidence of Common Ancestry and Diversity (3-LS4-A)

Some kinds of plants and animals that once lived on Earth are no longer found anywhere.

Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

Adaptation (3-LS4-C)

For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

shadow. (In this case distance is the “x” axis.)

2. How species change in the same place:

Students study how juniper distribution

changed over *time* at the Hixon ranch (Chp 5),

and draw a timeline of approximate numbers of junipers changing in recent history.

See also 3G about life surviving after fire.

3D. Class discusses fossils in *Ricky’s Atlas* and what they know about fossils more locally or from their own experience.

3E. Fossil kit with 20 fossils can be borrowed from the John Day National Monument that students can handle, and for which they can create a timeline. (www.nps.gov/joda)

3F. Class views “Kylie’s Fossil find”, from the Badlands National Park,(powerpoint or video) that tells the true story of 7-year-old Kylie discovering a saber-toothed cat fossil! (nps.gov/badl/learn/education/classrooms/kyliefossilfind)

3G. Students review Chps. 4, 5 and 6 to list plants and animals that have structures or behaviors that help them survive fire. They choose one

Biodiversity (3-LS4-D)

Populations live in a variety of habitats and change in those habitats affects the organisms living there.

Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. (3-LS4-4)

Engaging in Argument from Evidence:

Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4)

Cause and Effect (3-LS4-2, 3-LS4-3)

Cause and effect relationships are routinely identified and used to explain change.

organism to draw or write about.

3H. Students review changes after wildfire vs. prescribed fire (Chps. 6 & 7) then compare differences using drawings or written descriptions, including habitats or potential interactions between animals (e.g. predators and their prey).

See also 3C reviewing changes in junipers at the Hixon ranch.

3I. Students list changes related to prescribed burning in the forest (Chp 6) and the prairie (Chp 7) and write about how prescribed fire can help plants grow.

3J. Students review weather patterns (Chp 3 p 45- p. 46) and discuss effects of a mountain's rain shadow (see also 3C).

Online resource for kids from the national weather service helps explain weather patterns too.

<https://eo.ucar.edu/webweather>

See also: Chp 5 (fire suppression), Chp 6,7 about prescribed burn.

Systems and System Models (3-LS4-4)

A system can be described in terms of its components and their Interactions.

Crosscutting Connections to ELA/Literacy

R1.3.2 Determine the main idea of a text; recount the details and explain how they support the main idea.

R1.3.3 Describe the relationship between a series of historical events, scientific ideas, or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence and cause/effect.

W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

Connections to Mathematics

3MD.H3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how-many-more” and “how-many-less” problems using Information present in scaled bar graphs.

3K. Hand-drawn models or mobiles can be created for forest and grassland ecosystems described in the book, and revised to illustrate changes due to fire.

See 3G: adaptations to fire; 3H: comparisons between wildfire and prescribed fire.

3L. Students recount the historical record of fire, human use and grazing on arid grasslands in eastern Oregon as explained by Rosa Zamora and Henry Hixon (Chp 5).

See 3A: Students examine digital information about fossils.

3M. Using data from the aspen transects (Chp 7) students graph information for the 3 transects, with bars representing efforts by Ricky, Ellie and Sarah. By reading their graphs they answer questions like “Where were the most young trees?”

3-ESS2 Earth's Systems

Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

(3-LSS2-1)

Analyzing and Interpreting Data

Represent data in table and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships (3-ESS2-1)

3N. After discussing how the warm weather affects plants, animals and humans living in a rain shadow, students refer to rainfall information available on Ricky's website (from the Western Regional Climate Center: wrcc@dri.edu) that they graph as averages, for the summer or for the year.

Obtain and combine information to describe climates in different regions of the world. (3-ESS2-2)

Weather and Climate (ESS2.D)

Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)

3O. Following Activity 3N, students examine weather patterns for the same time period where they live and calculate rainfall averages for the summer months. Comparisons between eastern Oregon and their location are made in a table and/or a bar graph.

3-ESS3 Earth and Human Activity

Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. (3-ESS3-1)

Engaging in Argument from Evidence

Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints about how it meets the criteria and constraints of the problem.

See 3J, expanding the discussion to consider the effect of weather patterns in creating ecosystems prone to fire, and how prescribed fire reduces the threat of wildfire and improves growth of some plants.

Natural Hazards

A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1)

See 3J, and expanded activity described above.

Connections between Ricky' Atlas and Next Generation Science Standards **FOURTH GRADE**

(Blue type = Science & Engineering Practices; Red type=Disciplinary Core; Green type= Crosscutting Concepts and Connections to ELA/Literacy and Writing)

4-LS1 *From Molecules to Organisms: Structures and Processes*

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (4-LS1-1)

Engaging in Argument and Evidence

Conduct an argument with evidence, and/or a model (4-LS1-1)

4A. Students study how Ellie developed her map of vegetation and rainfall east of the mountains (Chp 3), and discuss how plateau plants are indicators of the aridity where they live. They consider adaptations important to daily survival (e.g. leaf forms, root depth) and long-term survival of the species (e.g. production of seeds).

Structure and Function

Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior and reproduction.

4B. Students identify structural adaptations of plants and behavioral adaptations of animals to survive fire (Chps 4,5,6). They choose one to draw and describe in a short paragraph.

Systems and System Models

A system can be described in terms of its components and their interactions (4-LS1-1; 4-LS1-2)

Connections to Writing

W4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information (4-LS1-1)

4-ESS1 Earth's Place in the Universe

Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time (4-ESS1-1)

The History of the Planet Earth (ESS1.C)

Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock were formed (4-ESS1-1).

Constructing Explanations and Designing Solutions (4-ESS1-1)

4C. Students identify flora and fauna of 1) the forest (Chp 6) and 2) the prairie grassland (Chp 7) after fire, then depict interactions between predators and prey, plants and their pollinators.

4D. Students look at maps of the western U. S. and look for arid regions (including deserts) in rain shadows behind mountains. To compare the effects of different mountains students list mountain heights and note the extent of dryness behind them. The Western Regional Climate Center has rainfall data for particular locations (wrcc@dri.edu). They describe a mountain or mountain range and its rain shadow in a short paragraph.

4E. Students review Chp 4 and Ricky's drawings about the age of mammals in his atlas, then study the geologic stratigraphy, matched to the age of fossils illustrated in the John Day National Monument website.

www.nps.gov/joda/learn/nature/fossils.htm

See Activity 4E in which students point out specific

Identify the evidence that supports particular points in an explanation.

layers where fossils that were tied to particular time periods in geologic history were found.

4-ESS2 *Earth's Systems*

Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.(4-ESS2-1)

Earth Materials and Systems (4-ESS2.A)

Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils and sediments into smaller particles and move them around (4-ESS2-1).

4F. Students examine photographs of geologies at John Day National Monument (see Activity 4E for website), and discuss examples from their own experience to recognize how erosion shapes landscapes, and what is revealed through erosion.

4G. Class views “Kylie’s Fossil find”, from the Badlands National Park,(powerpoint or video) that tells the true story of 7-year-old Kylie discovering a saber-toothed cat fossil! (nps.gov/badl/learn/education/classrooms/kyliefossilfind), and describes the role of erosion in revealing the remarkable fossil.

Cause and Effect (4-ESS2-1)

Cause and effect relationships are routinely identified, tested and used to explain change.

See Activities studying formation of rain shadows and effects of aridity on plant life (4A, 4D, 4H).

Analyze and interpret data from maps to describe patterns of Earth’s features. (4-ESS2-2)

Analyzing and Interpreting Data

Analyze and interpret data to make sense of phenomena using

4H. Using maps of Oregon and Washington, students study topography from the coast

logical reasoning (4-ESS2-2)

to eastern edges of the plateau and compare landforms to rainfall data composited from the U. S. Weather Service posted at *Ricky's Atlas* website. See also Activity 4A and 4D.

Plate Tectonics and Large-Scale System Interactions (4-ESS2.B)

The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water feature areas of Earth (4-ESS2-2)

See Activity 4D in which students study topography and rain shadows the mountains create.

Patterns

Patterns can be used as evidence to support an explanation. (4-ESS2-2)

See Activities 4E in which students examine geologic layers and fossils, 4H examining patterns of rainfall and topography.

4-ESS3 Earth and Human Activity

Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. (4-ESS3-2)

Natural Hazards

A variety of hazards result from natural processes (e.g., earthquakes Tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts (4-ESS3-2).

4I. Students review how prescribed fire in the forest and in a grassland work to reduce the effects of wildfire and influence the biological diversity those lands. They consider how wildfires are caused naturally in arid landscapes (Chp 2, 3 and 6)

4J. Students become more familiar with

prescribed burning by viewing techniques used by BLM and the U.S. Forest Service (At blm.gov/or/resources/fire/prescribed fire choose the prescribed fire photo gallery for photographs and video)

Connections to ELA/Literacy

RI4-1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

Activities 4A, 4B and 4I, in particular, require reference to the text and drawing inferences.

Connections between *Ricky's Atlas* and Next Generation Science Standards FIFTH GRADE

(Blue type = Science & Engineering Practices; Red type=Disciplinary Core; Green type= Crosscutting Concepts and Connections to ELA/Literacy)

5-ESS2 *Earth's Systems*

Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

(5-ESS2-1)

Developing and Using Models

Develop a model using an example to describe a scientific principle.

(5-ESS2-1)

5A. Students review how storms develop east of the mountains (Chp 3), how lightning develops (Chp 1, 2), and Ricky's experience during the thunderstorm (Chp 1). They draw a model of a storm as it develops across the plateau. Online resource from the National Weather Service also tells how storms are created (<https://eo.ucar.edu/webseather>).

5B. Students study Ellie's graphs of the rain shadow

Earth Materials and Systems

Earth's major systems are the geosphere (solid & molten rock, soil, & sediments), the hydrosphere (water & ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

Systems and System Models

A system can be described in terms of its components and their interactions (5-ESS2-1)

Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth (5-ESS2-2).

Scale, Proportion and Quantity

Standard units are used to measure and describe physical quantities such as weight and volume (5-ESS2-2).

5-ESS3 *Earth and Human Activity*

Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and Environment (5-ESS3-1).

Obtaining, Evaluating, and Communicating Information

Obtain and combine information from books and/or other reliable

created by the Cascade Mountains. Using data from the Western Regional Climate Center (wrcc@dri.edu), they graph precipitation across eastern Oregon, illustrating effects of the rain shadow. (A composite of rainfall data for several Oregon locations is provided on Ricky's website.) Examining maps or rainfall data behind other mountain ranges, particularly locally relevant to the class, can be used to compare how the magnitude of rain shadows vary.

5C. Students discuss the climatic, geographic and biological components of the semi-arid plateau. Diagrams of the interconnections will help them recognize how different components can describe the same landscape.

See 5B in which students graph precipitation.

5D. Students review ways in which prescribed burning was used in areas that Ricky and

media to explain phenomena or solutions to a design problem.
(5-ESS3-1)

Human Impacts on Earth Systems

Human activities in agriculture, industry and everyday life have had major effects on land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments (5-ESS3-1).

Connections to ELA/Literacy

RI.5.7 Draw information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably (5-ESS3-1).

Ellie visit (Chps 5,6,7). They learn about techniques of prescribed burning from the U.S. Forest Service website (At fs.fed.us click on prescribed fire: Ochoco National Forest, Crooked River National Grassland; and Deschutes National Forest). They also view photos and video about prescribed burning and learn about techniques at the Bureau of Land Management website (At blm.gov/or/resources/fire/prescribed burns click prescribed fire photo gallery).

5E. Students discuss how fire has been used historically by Native Americans and ranchers (Chp 5), and evaluate benefits of past and current practices.

See 5A Students use website data to better understand how storms are formed, 5B local rainfall data is obtained from online information, and 5D in which students combine information from the book with website descriptions.

See 5D requiring several online sources to understand techniques and purposes for prescribed burning.