



Beauty and the Beak Educational Guide

Idaho Alignment & Extension Activities

Idaho Content Standards

ELA Standards Reading/Literature
RL.3.7 Explain how specific aspects of a text's illustrations contribute to what is conveyed by the words in a story (e.g., create mood, emphasize aspects of a character or setting).
RL.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
RL.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
RL.3.4 Determine the meaning of words and phrases as they are used in a text, distinguishing literal from nonliteral language.
RL.4.4 Determine the meaning of words and phrases as they are used in a text, including those that allude to significant characters found in mythology (e.g., Herculean)
RL.5.4 Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.
RH.6-8.4 Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.

Reading/Informational Text
RI.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.
RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).
RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
CCRA.R.3 Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
CCRA.R.4 Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

Idaho Writing Standards
W.3.7 Conduct short research projects that build knowledge about a topic.
W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.
W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
W.6.7 Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

Idaho Life Science (4th grade)

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

LS1.A: Structure and Function • Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (LS1-4-1)

3rd Grade Social Studies- History

Objective(s): By the end of Grade 3, the student will be able to:
3.SS.1.1.1 Explain that people in the United States share a national identity through patriotic symbols and holidays.

3.SS.1.1.2 Investigate the history of your community.

Extension Activities

Math Exploration- Crafting Beauty's Beak

There are natural math extensions that can be explored through Beauty and the Beak. Students can apply their understanding of symmetry, 3D shapes, measurement of both length and mass, and graphing data. While numerous grade level standards reference the understanding and use of symmetry and geometric shapes, each grade level standards, kinder through 5th, include precise expectations for expressing measurement. In addition, students are required to represent their data in various plots, graphs, and tables.

In an effort to incorporate these math standards and applications of learning, students could work to replicate Beauty's prosthetic beak (see web link for lesson plan). Students will need to measure, record, and graph results of their prosthetic beak replica. Students will have opportunities to adjust and enhance their design, giving multiple opportunities to incorporate measurement and data to their model.

Additionally, if your classroom has access to a 3D printer, the .STL file to print an exact replica of Beauty's beak is available for download from the Idaho STEM Action Center. This download is available to all Idaho publicly-funded educational organizations through a licensing agreement with Birds of Prey Northwest. The use of this file is in conjunction with our non-fiction children's book, Beauty and the Beak. This file shall not be used by or distributed to any source outside of the immediate requestor. Printed beaks may not be sold or redistributed to others. The .STL file is copyrighted information. Request the 3D print .STL file at <https://stem.idaho.gov/beautysbeak/>.

Engineering A Prosthetic Beak:

<http://www.birdsofpreynorthwest.org/beauty-and-the-beak.html> (Click on 'Beauty STEM Activities')

Related Math Standards:

Measurement and Data - 1st grade

- MD1-Measure lengths indirectly and by iterating length units.
 - 1. Order three objects by length; compare the lengths of two objects indirectly by using a third object.
 - 2. Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that

the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps

Measurement and Data - 2nd grade

- MD2-Measure and estimate lengths in standard units.
 - 1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
 - 2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
 - 3. Estimate lengths using units of inches, feet, centimeters, and meters.
 - 4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Measurement and Data - 3rd grade

- MD3. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
 - 2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l) . Add, subtract, multiply, or divide to solve one - step word problems involving masses or volumes that are given in the same units
- MD3 Represent and Interpret Data
 - 4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units — whole numbers, halves, or quarters.

Measurement and Data - 4th Grade

- MD4- Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
 - 1. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two- column table.
 - 2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
- MD4- Represent and interpret data.

- 4. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots.

Measurement and Data - 5th grade

- MD5- Convert like measurement units within a given measurement system.
 - 1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
- MD5- Represent and interpret data.
 - 2. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots

Grade Level Standards	Activity Ideas
<p>Measurement and Data - 5th grade</p> <ul style="list-style-type: none"> ● MD5- Convert like measurement units within a given measurement system. <ul style="list-style-type: none"> ○ 1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. ● MD5- Represent and interpret data. <ul style="list-style-type: none"> ○ 2. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots 	<ul style="list-style-type: none"> ● Using Beauty's wingspan measurements from the book, convert from inches to feet, centimeters to meters, etc. ● Using the Engineering a Prosthetic Beak lesson, measure the beak model to a fraction of a unit (using $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$). Students can add up lengths of their beak model, before and after assembly. ● Students will test the effectiveness of their Prosthetic Beak by how many small items it can pick up (twigs and toothpicks, etc). The class and individual students can create a line plot to chart how many items their prosthetic beak picks up. Please note: An eagle's beak is designed to rip and tear flesh in order to eat. The class can read from the web resource about how eagle beaks tear through meat. Clarify that Beauty would not pick up items to hold in her beak in order to eat. This activity is meant for students to engineer the strongest beak possible, using related math. <ul style="list-style-type: none"> ○ http://projectbeak.org/adaptations/beaks_tearing.htm

Measurement and Data - 4th Grade

- MD4- Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
 - 1. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.
 - 2. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
 - MD4- Represent and interpret data.
 - 4. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots.
- The book references the growing eagle chick and adult eagle size. Using the additional web resources, students can examine the average weight of an eagle chick, adolescent eagle, to a full-grown eagle adult. They can convert from ounces to pounds and grams to kilograms.
 - <https://www.eagles.org/what-we-do/educate/learn-about-eagles/bald-eagle-biology/>
 - <http://www.pbs.org/wnet/nature/jungle-eagle-harpy-eagle-fact-sheet/7263/>
 - Students can convert the wingspan of an eagle from inches to feet and centimeters to meters.
 - Students can compare measurements of themselves, inches/feet and centimeters/meters, in comparison to Beauty. Measurements should be recorded in a two-column table.
 - Using the Engineering a Prosthetic Beak lesson, measure the beak model to a fraction of a unit (using $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$). Students can add up lengths of their beak model, before and after assembly.
 - Students can weigh their prosthetic beak using a digital scale, recording grams, then ounces. The class can record the individual weight of their designed beaks on a number line and/or line plot.
 - Students will test the effectiveness of their Prosthetic Beak by how many small items it can pick up (twigs and toothpicks, etc). The class and individual students can create a line plot to chart how many items their prosthetic beak picks up. Please note: An eagle's beak is designed to rip and tear flesh in order to eat. The class can read from the web resource about how eagle beaks tear through meat. Clarify that Beauty would not pick up items to hold in her beak, in order to eat. This activity is meant for students to engineer

	<p>the strongest beak possible, using related math.</p> <ul style="list-style-type: none"> ○ http://projectbeak.org/adaptations/beaks_tearing.htm <p>**For an additional activity focused on the ripping force of a Bald Eagle beak, see the Resources at the end of this document.</p>
<p>Measurement and Data- 3rd grade</p> <ul style="list-style-type: none"> ● MD3. Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. 2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l) . Add, subtract, multiply , or divide to solve one - step word problems involving masses or volumes that are given in the same units ● MD3 Represent and Interpret Data 4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units — whole numbers, halves, or quarters. 	<ul style="list-style-type: none"> ● Using the wingspan of Beauty from the book, students can compare her wingspan to their own height and their human arm span. Students can estimate and then measure their own height and arm span using a ruler and/or yardstick. ● Students can measure their individual heights and arm span to the nearest $\frac{1}{2}$ or $\frac{1}{4}$ of an inch. Students can then plot their height and arm span on a class line plot and compare to the wingspan of Beauty. ● Students can weigh their prosthetic beak using a digital scale, recording grams, then ounces. The class can record the individual weight of their designed beaks on a number line and/or line plot.
<p>Measurement and Data - 2nd grade</p> <ul style="list-style-type: none"> ● MD2-Measure and estimate lengths in standard units. <ul style="list-style-type: none"> ○ 1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. ○ 2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen. ○ 3. Estimate lengths using units of 	<ul style="list-style-type: none"> ● Using Beauty’s wingspan from the book, students can practice measuring an equivalent wingspan around the classroom using, rulers, yardsticks, meter sticks, and/or measuring tape. Students can measure various items multiple times, using different tools. ● Students can measure themselves, height and arm span, measuring to the nearest inch or nearest centimeter. Relate inches to feet and centimeters to meters. ● Students can determine the difference in height and arm span between classmates and between their own height/arm span

<p>inches, feet, centimeters, and meters.</p> <ul style="list-style-type: none"> ○ 4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. 	<p>with Beauty's wingspan.</p> <ul style="list-style-type: none"> ● Using the Engineering a Prosthetic Beak lesson, measure the beak model to the nearest inch or centimeter. Students can compare the lengths of their model to those of other students.
<p>Measurement and Data - 1st grade</p> <ul style="list-style-type: none"> ● MD1-Measure lengths indirectly and by iterating length units. <ul style="list-style-type: none"> ○ 1. Order three objects by length; compare the lengths of two objects indirectly by using a third object. ○ 2. Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps 	<ul style="list-style-type: none"> ● From the book, students can represent Beauty's wingspan of 6ft in the room (anchor chart or otherwise). Students can compare their own height and/or arm span to the wingspan of Beauty. ● Students can record their height by marking on a number line within Beauty's wingspan (anchor chart). ● The teacher can make a replica (or several) of the Prosthetic Beak. Students can compare smaller objects to the size of the beak replica. Students can practice measuring the length of the prosthetic beak by laying multiples of the smaller objects, end to end (with dice, dominos, erasers, etc.).

Science Extension- Exploring Beauty and Other Eagles

In the book *Beauty and the Beak*, the first third of the book introduces Beauty as a chick, her parents, her environment, and the attributes of a growing eagle. This is an opportunity to explore more deeply the inherited traits, characteristics, and overall life science of our national bird. Each grade level, Kinder through 5th grade, has supporting standards to focus on Beauty, her habitat, and what makes eagles unique. Whether students do this through a short research project, incorporate their understanding through art, or develop a multimedia presentation on their learning, exploring the life science of Beauty will make her story more powerful, as students compare and contrast her ability, characteristics, and life before and after she was injured.

Related Science Standards:

Life Science - Kindergarten

- Performance Standard

LS1-K-1. Use observations to describe patterns of what plants and animals (including humans) need to survive

LS1-K-2. Use classification supported by evidence to differentiate between living and non-living items.

- Supporting Content

LS1.C: Organization for Matter and Energy Flow in Organisms

Life Science - 1st grade

- Performance Standard

LS2-1-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

LS1-1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

- Supporting Content

LS1.A: Structure and Function

LS1.B: Growth and Development of Organisms

Life Science - 2nd grade

- Performance Standard

LS2-2-1. Make observations of plants and animals to compare the diversity of life in different habitats.

- Supporting Content

LS4.D: Biodiversity and Humans

Life Science - 3rd grade

- Performance Standard

LS2-3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

LS2-3-2. Use evidence to support the explanation that traits can be influenced by the environment.

- Supporting Content

LS3.A: Inheritance of Traits -Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (LS2-1-1)

LS3.B: Variation of Traits -Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (LS2-1-1)

Life Science - 4th grade

- Performance Standard

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

LS1-4-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

- Supporting Content

LS1.A: Structure and Function

LS1.D: Information Processing

Life Science - 5th grade

- Performance Standard

LS2-5-2. 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.

LS2-5-3. 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.

LS2-5-4. 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.

- Supporting Content

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

LS4.B: Natural Selection

LS4.C: Adaptation

LS4.D: Biodiversity and Humans

Grade Level Standard	Activity Ideas
<p>Life Science - 5th grade</p> <ul style="list-style-type: none"> ● Performance Standard <p>LS2-5-2. 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.</p> <p>LS2-5-3. 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.</p> <p>LS2-5-4. 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.</p> <ul style="list-style-type: none"> ● Supporting Content <p>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</p> <p>LS4.B: Natural Selection</p> <p>LS4.C: Adaptation</p> <p>LS4.D: Biodiversity and Humans</p>	<ul style="list-style-type: none"> ● Using information from the book, plus additional research, list the characteristics and traits of bald eagles, like Beauty. Discuss what the advantages are for surviving in her particular habitat. Research additional species of eagles and compare and contrast the advantages and disadvantages, based on the eagles' characteristics and particular habitat. Supplemental resources: <ul style="list-style-type: none"> ○ https://www.peregrinefund.org/explore-raptors-species/Bald_Eagle ○ http://www.conservewildlifenj.org/education/teacher/eagleedu/ ● Students can research and represent (through writing, models, multimedia, etc.) a solution to one of the threats to bald eagle habitats. The solution can solve a problem directly affecting eagles or the plants in the natural habitat of eagles. <ul style="list-style-type: none"> ○ Additional resources: <ul style="list-style-type: none"> http://www.pgc.pa.gov/Wildlife/EndangeredandThreatened/Pages/BaldEagle.aspx ○ https://www.eagles.org/what-we-do/educate/learn-about-eagles/bald-eagles-current-dangers/
<p>Life Science - 4th grade</p> <ul style="list-style-type: none"> ● Performance Standard <p>LS1-4-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <p>LS1-4-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.</p> <ul style="list-style-type: none"> ● Supporting Content <p>LS1.A: Structure and Function</p> <p>LS1.D: Information Processing</p>	<ul style="list-style-type: none"> ● Using the book, examine the external structure of Beauty and how this helps support her survival, growth, behavior, and reproduction. Students can use web resources to examine the internal structures of birds, in general. Students can demonstrate understanding through a Beauty "portrait" picture, labeling those internal and external structures. <ul style="list-style-type: none"> ○ https://www.thespruce.com/avian-anatomy-101-390395 ● Using a similar "portrait" of Beauty, diagram, written, or multimedia model, students can represent how Beauty uses her senses to navigate her habitat, grow,

	<p>learn to fly, hunt, etc. Use the book as a frequent reference for information.</p> <ul style="list-style-type: none"> Additional resources: <ul style="list-style-type: none"> https://www.thespruce.com/birds-five-senses-386441
<p>Life Science - 3rd grade</p> <ul style="list-style-type: none"> Performance Standard <p>LS2-3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.</p> <p>LS2-3-2. Use evidence to support the explanation that traits can be influenced by the environment.</p> <ul style="list-style-type: none"> Supporting Content <p>LS3.A: Inheritance of Traits -Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (LS2-1-1)</p> <p>LS3.B: Variation of Traits -Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (LS2-1-1)</p>	<ul style="list-style-type: none"> Using information from the book, students can identify Beauty's inherited traits from her parents. As a class, students can list these characteristics on an anchor chart and then compare similar traits in other species of eagles. <ul style="list-style-type: none"> Additional resources: <ul style="list-style-type: none"> https://www.eagles.org/what-we-do/educate/learn-about-eagles/bald-eagle-biology/ http://www.pbs.org/wnet/nature/jungle-eagle-harpy-eagle-fact-sheet/7263/ Students can use this information from the anchor chart to represent their understanding in a Venn diagram, double bubble thinking map, or other compare/contrast graphic organizer. Through an art project, diagrams, models, etc. students can show how Beauty's characteristics and inherited traits help her live and thrive in her natural environment.
<p>Life Science - 2nd grade</p> <ul style="list-style-type: none"> Performance Standard <p>LS2-2-1. Make observations of plants and animals to compare the diversity of life in different habitats.</p> <ul style="list-style-type: none"> Supporting Content <p>LS4.D: Biodiversity and Humans</p>	<ul style="list-style-type: none"> Drawing from the pictures and text in the book, students will discover the different characteristics and traits of Beauty. Students can represent their understanding in a drawing or model, individually or as a class. Drawing from the pictures and text from the book, students will identify the characteristics of Beauty's natural habitat before she was injured. Students can represent their understanding in a drawing or model, individually or as a class. Students can compare the information learned about Beauty's life and habitat when she lived in the wild to their local environment and local birds they might see.

	<p>A comparison/contrast graphic organizer can be used to illustrate the different life and habitats of Beauty and local connections.</p>
<p>Life Science - 1st grade</p> <ul style="list-style-type: none"> ● Performance Standard <p>LS2-1-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.</p> <p>LS1-1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</p> <ul style="list-style-type: none"> ● Supporting Content <p>LS1.A: Structure and Function</p> <p>LS1.B: Growth and Development of Organisms</p>	<ul style="list-style-type: none"> ● Using the pictures and text from the book, students will discover and identify the characteristics of Beauty as an eagle chick and an adolescent eagle. Students will compare and contrast Beauty as a young eagle, compared to her parents. This comparison and contrast can be done as a class on an anchor chart. ● Students can draw a picture of Beauty in her natural habitat and write a short summary of how Beauty survived in the wild before her injury. <ul style="list-style-type: none"> ○ Additional resources: https://kids.nationalgeographic.com/animals/bald-eagle/#bald-eagle-closeup.jpg ○ https://www.youtube.com/watch?v=oKficmlxzal
<p>Life Science - Kindergarten</p> <ul style="list-style-type: none"> ● Performance Standard <p>LS1-K-1. Use observations to describe patterns of what plants and animals (including humans) need to survive</p> <p>LS1-K-2. Use classification supported by evidence to differentiate between living and non-living items.</p> <ul style="list-style-type: none"> ● Supporting Content <p>LS1.C: Organization for Matter and Energy Flow in Organisms</p>	<ul style="list-style-type: none"> ● Using the pictures and text from the book, students will identify the characteristics of Beauty that help her survive. Students can draw a picture of Beauty and discuss/label the pictures as a class. ● Students can draw/discuss what we as humans need to survive and how that compares to Beauty. ● Students can draw a picture of Beauty in her natural habitat before her injury and label those living and non-living items in the picture. <ul style="list-style-type: none"> ○ Additional resources: https://kids.nationalgeographic.com/animals/bald-eagle/#bald-eagle-closeup.jpg ○ https://www.youtube.com/watch?v=oKficmlxzal

Science Extension- Exploring Beauty's Place in the Ecosystem

Key to Beauty's story is the environment in which she lives. Her natural habitat serves as the backdrop for her time as a chick, learning to fly and hunt, and growing up in a forest ecosystem. This gives students a natural connection to examine various ecosystems, movement and energy within the environment, the interconnection between plants and animals, food webs, and more. Numerous standards support the examination of ecosystems and the plants and animals within them. While Beauty now lives at Birds of Prey Northwest under human care, students could create a model of what Beauty's forest ecosystem in northern Idaho would look like if she lived in the wild. They can compare and contrast ecosystems in Idaho, map diverse ecosystems for eagles around the country, or create a piece of art that incorporates Beauty's food web. There are numerous possibilities to incorporate the earth, life, and physical science standards that can more fully explore Beauty's place and role in the forest.

Related Science Standards:

Earth Science - Kindergarten

- Performance Standard

ESS1-K-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

- Supporting Content

ESS2.E: Biogeology

Life Science - 2nd grade

- Performance Standard

LS1-2 Ecosystems: Interactions, Energy, and Dynamics

LS2-2-1. Make observations of plants and animals to compare the diversity of life in different habitats.

- Supporting Content

LS4.D: Biodiversity and Humans

Earth Science - 2nd grade

- Performance Standards

ESS2-2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area.

- Supporting Content

ESS2.A: Earth Materials and Systems

Life Science- Ecosystems, Interactions, and Dynamics- 3rd grade

- Performance Standard

LS1-3-1. Construct an argument that some animals form groups that help members survive

Life Science - 4th grade

- Performance Standard

LS2-4-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

- Supporting Content

LS2.A: Interdependent Relationships in Ecosystems

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

Physical Science - 5th grade

- Performance Standard

PS3-5-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

- Supporting Content

LS1.C: Organization for Matter and Energy Flow in Organisms

Grade Level Standards	Activity Ideas
Physical Science - 5th grade <ul style="list-style-type: none"> ● Performance Standard PS3-5-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. <ul style="list-style-type: none"> ● Supporting Content LS1.C: Organization for Matter and Energy Flow in Organisms	<ul style="list-style-type: none"> ● Using the book, explore Beauty's food options within her natural habitat. Construct Beauty's food web and elaborate how that food's energy helps Beauty's body growth and maintenance. ● Students can draw Beauty in her natural habitat and diagram and/or summarize parts of the food web, including the sun.
Life Science - 4th grade <ul style="list-style-type: none"> ● Performance Standard LS2-4-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. <ul style="list-style-type: none"> ● Supporting Content LS2.A: Interdependent Relationships in Ecosystems LS2.B: Cycles of Matter and Energy Transfer in Ecosystems	<ul style="list-style-type: none"> ● Using the book, students could model through various art media or multimedia the movement of matter within Beauty's natural habitat. ● Explore Beauty's ecosystem in the book and create a representation of her forest ecosystem, labeling the various parts, and summarizing the cycles present in that ecosystem. ● Students can compare Beauty's habitat/ecosystem to others around Idaho or our region.

<p>Life Science- Ecosystems, Interactions, and Dynamics - 3rd grade</p> <ul style="list-style-type: none"> ● Performance Standard <p>LS1-3-1. Construct an argument that some animals form groups that help members survive</p>	<ul style="list-style-type: none"> ● Using the book, examine and discuss what support Beauty had as an eagle chick. Explore how living with her parents helped her survive and learn. ● Explore Beauty’s ecosystem in the book and create a representation of her forest ecosystem, labeling the various parts and interaction. This can be done through art or multimedia.
<p>Life Science - 2nd grade</p> <ul style="list-style-type: none"> ● Performance Standard <p>LS1-2 Ecosystems: Interactions, Energy, and Dynamics</p> <p>LS2-2-1. Make observations of plants and animals to compare the diversity of life in different habitats.</p> <ul style="list-style-type: none"> ● Supporting Content <p>LS4.D: Biodiversity and Humans</p> <p>Earth Science - 2nd grade</p> <ul style="list-style-type: none"> ● Performance Standards <p>ESS2-2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area.</p> <ul style="list-style-type: none"> ● Supporting Content <p>ESS2.A: Earth Materials and Systems</p>	<ul style="list-style-type: none"> ● Using the book, explore Beauty’s natural habitat and identify parts of the forest ecosystem. ● Students can draw or model a representation of Beauty’s forest ecosystem, noting plants and animals, and compare/contrast to different ecosystems in Idaho. ● Using the book, explore Beauty’s natural habitat. Students can develop a model, either by drawing or 3-dimensional, of the land and water in her natural environment. ● Students can compare and contrast that model to Beauty’s new home in northern Idaho and to other areas around our state.
<p>Earth Science - Kindergarten</p> <ul style="list-style-type: none"> ● Performance Standard <p>ESS1-K-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.</p> <ul style="list-style-type: none"> ● Supporting Content <p>ESS2.E: Biogeology</p>	<ul style="list-style-type: none"> ● Using the book, have students discuss and draw how Beauty and her parents used the environment around them to meet their needs. ● Students can draw or model the natural habitat of Beauty before her injury and examine and label how plants and animals use their surroundings to live and thrive.

Engineering and Design Extension- Design a Bird Feeder or Nest Box

Students can put their research, science, engineering, and math into a project that helps birds in their local neighborhood or community. Depending on the specific area in Idaho, there are numerous resources, both online and local connections, to assist students in building a bird feeder or nest box for your local birds. Each region in Idaho has an Audubon Society with great information and resources about your region's birds, field trips, programs, and more. Also, your local office of the Idaho Department of Fish and Game will most likely have cheap (or even free) Nest Boxes available to build. With either project, students will be able to integrate multiple content area skills to design and construct something that helps their local birds.

Nest Box Resources:

<https://idfg.idaho.gov/old-web/docs/wildlife/nongame/leafletBluebirdBoxes.pdf>

http://www.bonnercountydailybee.com/lifestyles/20170319/bluebird_nest_boxes_available_from_idfg

https://www.uidaho.edu/-/media/UIdaho-Responsive/Files/Extension/forestry/WL4_Building-Birdhouses-to-Attract-Insect-Eating-Birds.ashx

<https://thebirdersreport.com/resources/nest-box-birdhouse-plans>

Bird Feeder Resources:

<https://www.birdzilla.com/in-the-backyard/state-based-information2/idaho.html>

<https://www.birdwatchersdigest.com/bwdsite/learn/top10/winter-bird-feeding.php>

https://www.idahopress.com/community/idaho-fish-and-game-gives-bird-feeder-advice/article_c9fafc27-e11f-598f-ae88-ecb5da512981.html

MORE RESOURCES

General Idaho Bird

Idaho Centers where you can view live birds of prey:

www.birdsofpreynorthwest.org (Coeur d'Alene)

www.Peregrinefund.org (Kuna)

Other Resources

<https://idfg.idaho.gov/IFWIS/ibt/default.aspx>

<http://birdhouseandhabitat.net/>

General Extensions to accompany *Beauty and the Beak*:

You Tube videos of Beauty:

https://www.youtube.com/watch?v=P0bBn_vIR6E AND

www.Birdsofpreynorthwest.org - Click "Video About Beauty"

Wildlife and Pet Prosthetics- <https://www.eie.org/engineering-everywhere/curriculum-units/prosthetics>

<https://3dprint.com/147888/computer-aided-pets-project/>

<http://www.mvr.usace.army.mil/Portals/48/docs/Recreation/ODM/pdf/Bald%20Eagle%20Activity%20Guide.pdf>

https://www.teachengineering.org/activities/view/cub_biomed_lesson01_activity1

<http://teachers.egfi-k12.org/lesson-build-a-prosthetic-device/>

Birds of Prey NorthWest is available to travel to your Idaho educational institution with trained eagles, hawks, owls, falcons, and ospreys for a unique learning experience! Through a generous sponsorship from STEM AC, your institution may qualify for just such a program. Visit birdsofpreynorthwest.org for more information.

BEAUTY AND THE BEAK

Bald Eagle Ripping Force STEM Activity

Created by Deborah Lee Rose and Jane Velkamp, coauthors of *Beauty and the Beak*



USFWS photo of a wild Bald Eagle ripping food from its prey

BALD EAGLE BEAK RIPPING FORCE STEM ACTIVITY

Bird beaks are adapted for many ways of eating, like pecking for insects, cracking seeds, sipping nectar, scooping fish, or ripping pieces of food from prey. A Bald Eagle's beak and body are adapted in four ways that together make enough force for this raptor to rip pieces of fish or meat from its prey:

- 1) the top beak's curved and sharp-tipped shape for tearing into food
- 2) the clenching of top beak against bottom beak to grip bites of food
- 3) the powerful neck muscles for pulling the head and beak to rip food
- 4) the tight grip of talons on the feet for holding prey while ripping.

This hands-on Bald Eagle beak activity models adaptations 2-4. If possible, first have learners watch a video of a wild Bald Eagle ripping food, such as:

https://academy.allaboutbirds.org/bald-eagles-and-crows-eat-fish-on-an-alaska-beach/#_ga=2.249156612.2019790767.1520149660-1689591771.1517419109

WHAT YOU NEED/WHAT TO DO



Each person or group needs a spring-action clothespin at least 2" long, and a 3" X 3" wax paper square. (Older learners can also try using a staple remover.)

Hold one edge of the wax paper tightly with one hand. (This replicates the Bald Eagle's talons holding its prey.)

Hold the clothespin in the other hand and squeeze it to open. Then close the pin to grasp the wax paper, about an inch in from the edge opposite of the handheld edge. Tightly grip the clothespin on the wax paper. (The clothespin replicates the Bald Eagle's clenched beak.)

Make a strong pulling motion with the clothespin, up, down, and/or sideward. (This replicates the Bald Eagle's clenched beak, neck muscles, and talons creating opposing forces to rip off pieces of food.)

WHAT HAPPENED?

How well does the clothespin "beak" rip?

To compare the Bald Eagle's ripping force to other birds' beak function, try to tear wax paper with other beak models like a toothpick, chopsticks, spoon or straw. How well do the other beak models rip?

Discuss how different beaks help different bird species feed in their habitats.



USFWS before/after photo of Beauty the Bald Eagle by Glen Hush

BEAUTY AND THE BEAK

Download the free educational guide to *Beauty and the Beak*, including NGSS and other standards connections, at https://cornelllabpublishinggroup.com/wp-content/uploads/Beauty_EduGuide_Digital.pdf?v=7516fd43adaa.

Beauty the Bald Eagle was living wild, until the top of her natural beak shattered when she was illegally shot. Without her top beak and its curved, sharp-tipped shape, she could not rip into her prey, or close her beak to create the opposing ripping force of her top beak against her bottom beak.

A pioneering, 3D-printed prosthetic beak gave Beauty back some of her normal beak function. With her new top beak, she could fully close her beak to swallow water or grip a twig, and preen her feathers with her sharp beak tip. But the prosthetic could not be attached strongly enough for Beauty to rip food.

Read Beauty's true story and learn more about Bald Eagle adaptations and conservation in *Beauty and the Beak: How Science, Technology and a 3D-Printed Beak Rescued a Bald Eagle*.

The book is written by Deborah Lee Rose and Jane Veltkamp, published by Persnickety Press with special content from Cornell Lab of Ornithology, and won the AAAS/Subaru SB&F Prize for Excellence in Science Books. Jane Veltkamp led Beauty's beak engineering team. Visit birdsofpreynorthwest.org.