

## Science Processes and Inquiry:

### I. Introduction to Birds

Most birds have many characteristics that allow them to fly such as hollow bones and feathers, both of which are very light. Feathers also provide insulation and protection. Because of these characteristics, birds often appear much heavier than they actually are. (For Example: Students often guess that our Bald Eagle, Fiona weighs 50 lbs when she actually weighs only about 9 lbs).

Of course there are always exceptions to the rule as can be seen with non-flighted birds such as penguins and ostriches. Penguins do not have hollow bones, and the added weight acts as a “diving belt” that helps them dive to deeper depths. Ostriches have solid, marrow-filled bones as well. The denser bones in their legs give the birds much needed strength for running at great speeds while supporting their large bodies. They are also used in defense through kicking.

#### Grade 6

##### Process Standard 1: Observe and Measure-

- 1.2: Use appropriate tools (e.g., metric ruler, graduated cylinder, thermometer, balances, spring scales, stopwatches) to measure objects organisms, and/or events.
- 1.3: Use appropriate System International (SI) units (i.e., grams, meters, liters, degrees, Celsius, and seconds); and SI prefixes (i.e., micro-, milli-, centi-, and kilo-) when measuring objects, organisms and/or events.

#### **Activity: I’m a Wandering Albatross!**

(This activity also included in Math lesson plans)

Objective: To allow students to learn about different species of birds and help them to understand how to accurately measure mass and length with the appropriate SI units. This activity will also help students to relate grams and meters to everyday objects, helping them to get a better grasp of using the SI units.

#### Materials: Balances (triple beam)

- Scale that measures in grams (for larger birds above 1000 g)
- Bird Field Guide and/or
- Access to a reliable bird information website
- Meter sticks and rulers with SI units
- Masking tape
- Pens and pencils
- Graph paper
- Assorted classroom objects (erasers, books, paper clips, etc...)

Procedure:

- 1) Allow students to look through a bird field guide or a bird information website.
- 2) Have each student (or group of students) pick a different species of bird. Encourage them to choose birds of all sizes and from different Orders and Families so that the class “flock” is a diverse group.
- 3) Students should then look up the average mass and wingspan of their particular bird.

Note: Females and males of many species of birds can vary substantial amounts in size. If there is a range available for both sexes, students may average the two together.

- 4) Have each student find common objects around the classroom (books, pencils, paper clips, etc...) that they think will equal the mass of the bird that they researched.
- 5) Using a triple beam balance (for birds under 1000 grams), have the students determine the mass of their objects and compare it to the mass of their bird.

For larger birds over 1000 grams, a larger scale must be used. An option is a cooking scale, either digital or spring, that also measured in SI units.

- 6) After the masses of their objects have been measured, ask students to alter the objects or the amount of objects in the balance pan until the mass is equal to the mass of their bird.

(Example: A student picked a Ruby-Throated Hummingbird with an average mass of 4 grams, but chose objects with a mass of 10 grams. That student could either take some of the objects away or try to find different/smaller objects such as paperclips or buttons.)

- 7) Starting at a common point on the wall or chalkboard, have each student take turns measuring their bird’s wingspan with meter sticks or rulers. Students should mark and label their measurements with chalk or masking tape.
- 8) Once every student has measured and labeled their particular bird on the chalkboard, have students record all of the birds in the “class flock” along with their mass and wingspan measurements.
- 9) Allow each student to go to the chalkboard to determine “which bird they are.”

Facing the board, have students place the tip of their left middle finger on the common starting point and stretch both arms as far as they can. Determine which bird wingspan the tip of their middle finger on their right hand is closest to in order to decide which bird's wingspan they match.

- 10) Record everyone's name and the bird with which they are associated.
- 11) Create a bar graph for the following sets of data:
  - a) Mass/Bird –Data from step 8
  - b) Length/Bird –Data from step 8
  - c) number of students/bird or wingspan –Data from step 10

*\*\*Ensure that all units are SI units and labeled correctly.\*\**

## Life Science:

### *Biodiversity and Bio-indicators*

An **ecosystem** refers to a group of living organisms interacting among themselves and with their environment. Whether predator or prey, birds are an integral part of our ecosystem. **Biodiversity** is the variety of life, and it includes several levels: living organisms (crows, cacti, coyotes, etc.), genetic variations among organisms (different colored roses, differences in body size among the same species), and different ecosystems (forest, prairie, wetland, coastal, etc.). Greater biodiversity in a system provides greater stability and resilience to both natural and human-caused disturbances.

Birds are found on every continent and in nearly every habitat. Their ability to fly demands a fast metabolism, which in turn leads to faster processing of environmental quality. Because birds show symptoms and indications of poor environmental health before many other animals, they are referred to as biological indicators or bio-indicators. **Bio-indicators** are a group or class of organisms whose populations or status can be used to determine environmental health.

Because all things on earth are interconnected, losing one species can have a devastating effect on other species in an ecosystem, sometimes in ways that we would not foresee. That is why preserving biodiversity is important to us all.

### Grade 6

#### Standard 4: Populations and Ecosystems-

4.1: Organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Some source of energy is needed for all organisms to stay alive and grow. Energy transfer can be followed in food chains and webs.

4.2: In all environments, organisms with similar needs may compete with one another for resources including food, space, water, air, and shelter. Other relationships may be beneficial.

**Activity: We're All Connected!**

(This activity is also included in the Social Studies lesson plan)

Objective: To demonstrate to students the importance of biodiversity and how all things on earth are connected.

Materials: Ball of Yarn  
Species Cards  
Tape

Procedure:

- 1) Explain to students that they are each going to play the role of a component in a forest ecosystem.
- 2) Assemble students in a circle and assign each a species of plant, animal, or non-living thing (see suggested list).

Note: If there is time, allow students to write and draw their component themselves.

- 3) Have students look around the circle at each other and think about how plants, animals, and non-living things are connected.
- 4) Have one student hold onto the end of the yarn and toss the ball to another student, explaining his/her ecological connection to the other student.

Example: The Red-shouldered Hawk is connected to the tree because the tree provides a structure for the bird's nest, as well as a perch from which the hawk can hunt animals on the ground below.

- 5) Have the second student toss the ball of yarn to another student and explain their connection. As each student makes a connection, wrap the yarn around the student's waist. A big complicated web will start to form.
- 6) When all students are connected in the web, explain that harming any part of the web affects many other parts. Have students imagine what would happen if the tree were cut down (the tree student can shake or tug on the yarn). What would happen if the bird died (have the bird fall to the ground)? Ask the other students if they can feel the changes in their yarn.
- 7) When the students have played for a while, ask them to stop and notice which components of the ecosystem have the most connections to others and

why. Make note of components that would cause the most disturbance to the ecosystem.

### **Suggested Ecosystem Components**

Sun	Red-shouldered Hawk
Tree	Water
Vulture	Mouse
Sparrow	Bat
Mosquito	Mushroom
Turtle	Millipede
Fish	Eagle
Ant	Woodpecker
Frog	Log
Coyote	Fox
Rabbit	Pigeon
Sunflower	Spider
Moth	Deer
Crow	Scorpion
Poison Ivy	Human