Alaska Migratory Bird Calendar Contest 2012

Information for educators

The theme for this year's calendar is "**Birds in Alaska's Circle of Life**." Entries in the poster and literature contests should reflect this theme. Below are some activities and ideas for teachers to explore and develop this theme with their students.

We have developed 3 primary ways this theme could be expanded upon for lessons in the classroom; of course, you may come up with more ideas. Each of these 3 cycle-related topics is outlined below.

1. Life cycles:

Students can explore the life cycle of birds, with a local bird as their representative. Students might compare the life cycle of birds with that of other animals, including mammals (non egg-layers), salmon, insects, or amphibians. Older students can also look more closely at life history events such as molting, longevity, or which habitats are important at different parts of the birds' lives.

Possible activities for this topic would be to study the stages of the life cycle and put them in order, to construct a visual model of the life cycle, or to learn some of the vocabulary such as egg, hatch, etc.

Online resources:

- Lesson plan on frog, dragonfly and butterfly life cycles, designed for grades K-2. Includes cards with photos and a video to watch online. http://www.teachersdomain.org/resource/tdc02.sci.life.cyc.lp_lifecycle/
- Outline for an activity investigating boiled and uncooked chicken eggs: http://www.blackpineanimalpark.com/programs/Second/Life%20Cycle%20of%20a%20Bird.pdf
- Activity in which students read about bird life cycle and put stages in order: http://www.sylvandellpublishing.com/documents/StoryTimeEvents/Loon-Craft.pdf
- Website with an interactive graphic of general bird yearly cycle, good for students to investigate on their own, or to go through together on a smart board: http://www.bird-friends.com/Life.html

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2. Seasonal cycles:

Take a look at the activities of birds at different times of the year in comparison to our own, and think about how birds are important indicators of the changing seasons in our part of the world. If you didn't have a calendar, and you paid very close attention to what birds are doing and where they are going, could you use this information to figure out what season or maybe month it is?

An exploration of what migration is, and why birds might migrate (as well as why some birds like ravens or ptarmigan stay around all year) could also fit well into this theme. Older students might investigate cues birds use to find their way during migration, how they know when it is time to migrate, adaptations for migration, and how climate change might affect migratory birds. Another topic could be looking at birds that have different plumages at different seasons.

Possible activities include constructing a month-by-month timeline which lists common activities for people in your community as well as information about the activities of a few common bird species for

each month; talking about why we have seasons, what we like about each season; when students normally see birds, what birds are doing at these times, and what season it is when we see them doing different things.

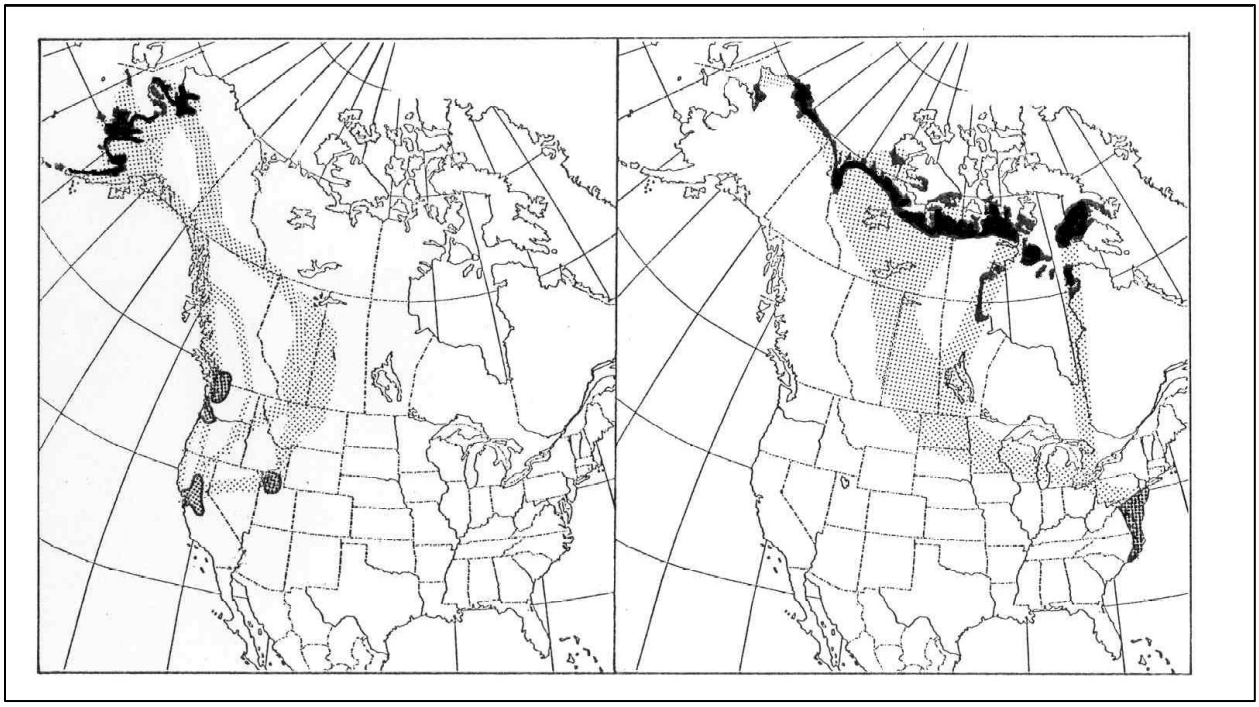
3. Geographic/migratory cycles:

Birds are amazing creatures when you sit back and think about some of their feats. Migration is one of these feats that cause many to marvel. Tracing the migration of a tiny bird on a world map, calculating the amount of energy they expend to travel the way they do, or pondering their experiences as they navigate back to the same nesting territory year after year may bring students to see birds in a new light. Because they go from their summer breeding grounds to their wintering areas, then back to their summer homes here in the arctic in a fairly regular way, this pattern can be interpreted as a circle, with arrows on a map, and certainly part of Alaska's circle of life!

Below are links to help you learn more about some birds that are fairly well known in the area, particularly about their migratory patterns. You can use this information in geography lessons, to have students sort the birds by distance traveled, or to talk about conservation and how the birds use many different areas and need habitat all along the flyways. You may also wish to talk about how Alaska is connected to other regions by sharing or hosting the same birds at different times of year.

A. Tundra swans: note that the swans from the Kotzebue Sound area mostly winter in the Rocky Mountains and along the west coast, while those from northern areas travel further east
Tundra swan migration and life history: http://tundraswanmigration.org/main/abouttusw.htm

Swan info (ADFG wildlife notebook): http://www.adfg.state.ak.us/pubs/notebook/bird/swans.php



Tundra swan migratory maps (from http://www.pacificflyway.gov/Documents/Wts_plan.pdf)

B. Arctic Terns: these birds hold the record for the longest migration, going practically from pole to pole

- Lesson plan, seasons, migration: http://www.nationalgeographic.com/xpeditions/lessons/09/gk2/migrationterns.html
- Arctic tern record migration info: http://www.livescience.com/animals/Arctic-tern-record-migration-100111.html
- Arctic tern life cycle and migration game w/ props: http://www.ellenjmchenry.com/sitebuildercontent/sitebuilderfiles/arctictern.pdf

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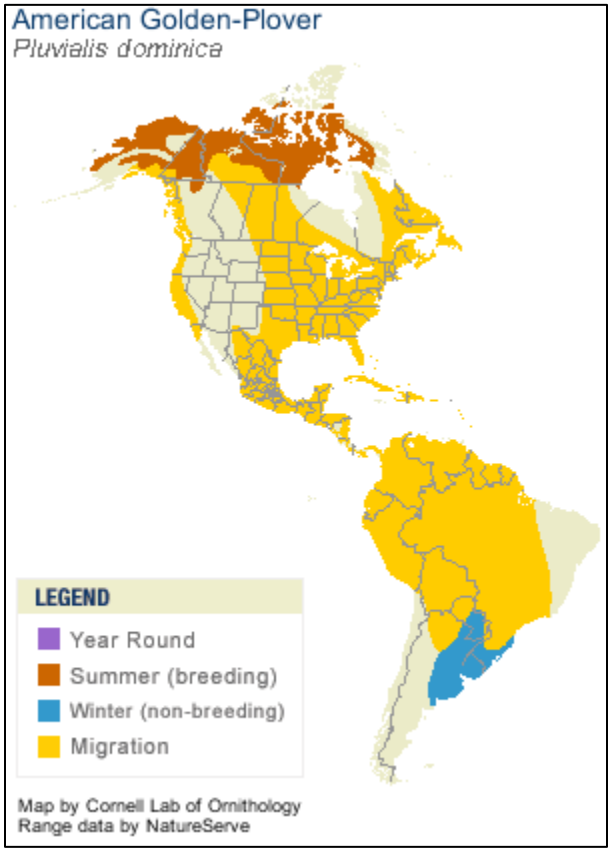
C. Black Scoters:

General info on black scoters: http://www.seaduckjv.org/infoseries/blsc_sppfactsheet.pdf

Black scoter migratory map, from the above fact sheet. Blue is summer range and orange is winter.

D. American golden-plover:

General info on plovers: http://www.adfg.state.ak.us/pubs/notebook/bird/plovers.php



Plover migration map (from http://www.allaboutbirds.org/guide/American_Golden-Plover/lifehistory)

Avian Olympics: (see following pages) this activity is designed for grades 6-9 but could easily be simplified for younger audiences. Students measure and record some of their physical feats and then compare them to those of shorebirds. Various math skills are used to quantify the differences. It could be fun to adapt this for a PE lesson to get kids flapping their wings, running for distance or speed. Activity reproduced from Arctic Nesting Shorebirds curriculum, USFWS.

- Activity -

AVIAN OLYMPICS

Grade level: 6 - 9

Objectives: By competing in physical and math/science activities, learn that birds have some incredible physical abilities. Learn that birds need these abilities to successfully migrate long distances. Be able to describe some of these physical abilities. Learn that migration is an essential, annual part of the life of a shorebird. Learn why individual birds may not survive a difficult migration. Explore the relationship between calories, fat, and energy. Practice working with others in cooperative groups. Practice math, stopwatch, mapping, and laboratory weighing skills. Practice making comparisons. Practice use of the metric system.

Duration: One to three 40-minute class periods. (Activity can be continued for short periods on several days if desired.)

Materials: Triple-beam balance or other scale, for use in Step 2, below
Clock with second hand visible to entire room, or one stop watch per group
World map with kilometer scale
Student worksheet (included)
50 meter track or running area

Procedure:

1. Form Teams:

a. Divide the class into cooperative groups of 3 to 6 students. Groups will compete against each other in problem-solving, math skills, speed, and endurance. Each team selects a mascot migratory shorebird group, such as plovers, oystercatchers, sandpipers, curlews, turnstones, godwits, and phalaropes. The object of each team is to get the most possible points. You may wish to shorten or lengthen the lesson by awarding points to only certain answers, and doing the other calculations as a class.

b. Hand out a copy of the student worksheet to each group.

2. Weigh-in:

a. The average middle school student's weight is 100 lbs or 45 kg. Ask students how many grams are in 45 kg.
Answer: 45,000 g

b. Compare that weight to the weight of the Western Sandpiper which weighs about 25 grams (less than 1 oz). Have the teams try to find an object in the classroom that weighs 25 grams. Test their entries with a triple-beam balance. If no team is close, give them all a second chance to see how close they can get with different objects. The team that is closest earns one point.

c. Have each team, working together, calculate how many Western Sandpipers (at 25 grams) it would take to equal the weight of an average middle school student (at 45 kg). The group that does this the fastest earns one point.

Answer: 45,000 g ÷ 25 g = 1,800 Western Sandpipers

3. Eating like a bird (Fat-loading):

This is a math contest, and all students on each team should work as a cooperative group to find the answers. Tell the class that when a team gets the answer (to "b", "c", and "d"), they should raise their hands. Ensure communication among the team members by telling them that the teacher will call on any member of the team that s/he chooses for the answer.

a. One quarter-pound hamburger and fries is an average-sized meal for a student of this size. Two or three burgers would be a huge meal. What's the largest number of quarter-pound hamburgers any of the students has ever eaten in a single meal?

b. What percentage of the average weight of a middle school student is this? (Assume a quarter-pound hamburger = 114 grams.) The first group with the correct answer gets one point.

Example answer: If 3 is the number of quarter-pounders:

3 burgers x 114 g (burger weight) = 342 g

342 g ÷ 45,000 g (student weight) = 0.76%, or less than 1%

c. Compare this with the Golden Plover, which gains enough fat to increase its body weight by almost 30% for its migration from Hawaii to Alaska. If an average student weighing 45 kg were going to increase his/her body weight by 30%, how much weight would s/he gain? The first group with the correct answer gets one point.

Answer: 45 kg (student wt) x .30 = 13.50 kg or 13,500g

d. How many quarter-pound hamburgers is this equal to?

Answer: 13,500 g ÷ 114 g (hamburger wt) = 118 burgers

4. Fast travel:

a. With each team entering its fastest runner, have a 50-meter dash to determine how long it takes a student to sprint 50 meters. The group with the fastest sprinter gets a point.

b. Calculate how long it would take this runner to cover 1 km.

Example answer: If a student runs 50 meters in 15 seconds,

$$\frac{15 \text{ seconds}}{50 \text{ meters}} \times \frac{X \text{ seconds}}{1{,}000 \text{ meters}}$$

15,000 = 50X

$$\frac{15{,}000}{50} = X \text{ seconds} = 300 \text{ seconds}$$

300 seconds ÷ 60 = 5 minutes to cover 1,000 meters

c. Then, using a map of the world, have students estimate the distance in kilometers from their school to Lima, Peru. Using the two measurements, have students calculate how long it would take the fastest student to sprint directly to Lima, assuming s/he could run in a straight line without stopping. Give a point to the team with the first correct answer.

Example answer: 60 minutes ÷ 5 min/km = 12 km/hour
7,500 km ÷ 12 km/hour = 625 hours, or
625 hours ÷ 24 hours/day = 26 days

Compare these results with Sanderlings, which are able to migrate 7,500 km (4,650 miles) between Oregon and Peru in 230 hours, or about 10 days.

5. Wing-flapping:

Have each team select a representative. Using a clock with a second hand, each team determines the highest number of arm flaps possible in 10 seconds.

a. Give a point to the group whose representative flapped the fastest (=most times per 10 seconds).

b. Using the time from the Fast travel event "4c" above, calculate how many arm flaps a student would make in a "flight" to Peru.

Example answer: For 11 flaps in 10 seconds,

$$\frac{11 \text{ flaps}}{10 \text{ seconds}} = 1.1 \text{ flaps per second}$$

$$\frac{1.1 \text{ flaps}}{1 \text{ second}} \times \frac{60 \text{ seconds}}{1 \text{ minute}} \times \frac{60 \text{ minutes}}{1 \text{ hour}} \times \frac{24 \text{ hours}}{1 \text{ day}} = 95{,}040 \text{ flaps per day}$$

95,040 flaps x 26 days = 2,471,040 flaps

c. *Advanced work:* Ask students what *assumptions* we are making to get answer "5b", and discuss why the answer might not be accurate. Students may suggest that we are comparing "flaps" (*flying*) with a *running* time. They may also note that we are (probably) using two different students, the one who ran fastest in the class and the one who flapped for each group. To do the calculations in "5b," we are assuming that whether students flap or run, they will cover the distance in the same amount of time. We are also assuming that all students will cover the distance in the same amount of time, or that differences between individuals of the same species are negligible. In science, it is important not to "compare apples to oranges," and to be aware of all assumptions made.

6. Non-stop travel:

a. Which student can continue flapping his/her arms the *longest*? Give that student's team a point. How does this feat compare with the American Golden Plover which flies non-stop for 48 hours as it migrates from Nova Scotia to South America? The Pacific Golden Plover and some curlews and tattlers fly non-stop for 2 to 3 days from Hawaii and other Pacific Islands to Alaska.

b. Discuss how *far* the class thinks the best runner of middle school age can run without stopping. How does this compare with some plovers, curlews and tattlers which fly non-stop from Hawaii and other Pacific Islands to Alaska, a distance of over 3,500 miles? The little Western Sandpiper flies over 250 miles per day between stop-over points along the Pacific coast flyway to Alaska.

7. Long-distance travel:

Have each team identify which of its members has lived farthest from his/her current home. Figure out how many kilometers away that is on a map. The group with a representative from the farthest away gets a point. Give another point to the group that calculates the kilometer distance for its representative the quickest. How does this compare with Sanderlings that fly over 11,000 km twice a year from their high-Arctic breeding grounds to nonbreeding ("wintering") grounds in Peru?

8. Fuel-efficiency:

a. Humans burn about 60 calories by running one kilometer. At this rate, how many calories would a student need to run from here to Peru? A point goes to the group that makes the correct calculation first.

Answer: Use a map to determine how many kilometers from your town to Lima, Peru, and multiply this number by 60 calories.

Example: 60 calories x 7,500 km = 450,000 calories

b. If one gram of fat yields 9 calories of heat, how many kilograms of fat would this student need to eat before making the trip?

Example answer: 450,000 calories ÷ 9 calories/g = 50,000 g

50,000 g ÷ 1,000 = 50 kg

c. Compare this with the Golden Plover, which can travel 3,900 kilometers (2,400 miles) in 48 continuous hours of flying using less than 60 grams (2.1 oz) of body fat. Does this bird burn a lot of calories per kilometer or few calories per kilometer?

9. Assessment:

Provide a reward to the team with the most points. Alternatively, give each group the number of points it earned or a set number of points, plus five extra points to the members of the winning team.

Adapted from Gilchrist et. al., <u>One Bird: Two Habitats</u>.

- Activity -

AVIAN OLYMPICS: *STUDENT WORKSHEET*

Directions:
Answer the following questions one at a time. Do not proceed to the next question until your teacher has given the class the direction to do so. Show all calculations. (Hint for math problems: Carrying *units* through calculations will help you see if your answer makes sense.)

1. Names of students in group:

   Choose a mascot migratory shorebird for your group name:_____

2. a. The average middle school student's weight is 100 lbs or 45 kg. How many grams are there in 45 kg?

   b. Compare the above weight to the weight of the Western Sandpiper which weighs about 25 grams (less than 1 oz). Find an object in the classroom that you think weighs 25 grams. Do this by hypothesizing, not by actually weighing it. What object did you select? Now weigh the objects and record what object came closest.

   c. How many Western Sandpipers (at 25 grams) would it take to equal the weight of an average middle school student (at 45 kg)?

3. a. What's the largest number of quarter-pound hamburgers any student has ever eaten in a single meal?

   b. What percentage of the average weight of a middle school student is this? (Assume that a quarter-pound hamburger = 114 grams.)

c. Compare this with the Golden Plover, which gains enough fat to increase its body weight by almost 30% for its migration from Hawaii to Alaska. If an average student weighing 45 kg were going to increase his/her body weight by 30%, how much weight would s/he gain?

d. How many quarter-pound hamburgers does this equal?

4. a. How long did it take the fastest student to sprint 50 meters?

b. Calculate how long it would take this runner to cover 1 kilometer.

c. Using a map of the world, estimate the distance in kilometers from your school to Lima, Peru. Using your answer from "b" above, calculate how long it would take the fastest student to sprint directly to Lima. (Assume s/he could run in a straight line without stopping.)

Compare these results with Sanderlings, which are able to migrate 7,500 km (4,650 miles) between Oregon and Peru in 230 hours, or about 10 days.

5. a. How many arm flaps can your group's representative do in 10 seconds?

b. Using the time calculated in "4c" above, calculate how many arm flaps a student would make in a "flight" to Lima, Peru.

6. a. Which group member can continue flapping his/her arms the longest? How long?

b. How far do you think the best runner of middle school age can run without stopping? How far do you think the average middle school student can run without stopping?

How does this compare with some plovers, curlews, and tattlers which fly non-stop from Hawaii and other Pacific Islands to Alaska, a distance of over 3,500 miles? The little Western Sandpiper flies over 250 miles per day between stop-over points along the Pacific coast flyway to Alaska.

7. Which group member has lived the farthest away from his/her current home? How many kilometers away is that?

How does this compare with Sanderlings that fly over 11,000 km twice a year from their high-Arctic breeding grounds to nonbreeding ("wintering") grounds in Peru?

8. a. Humans burn about 60 calories by running one kilometer. At this rate, how many calories would you need to run from here to Peru?

b. If one gram of fat yields 9 calories, how many kilograms of fat would you need to eat before making the trip?

c. How does this compare with the Golden Plover, which can travel 3,900 kilometers (2,400 miles) in 48 continuous hours of flying using less than 60 grams (2.1 oz) of body fat?