

Bird Adaptation and Survival

Duration:

1 - 2 class periods

Objectives:

Students will:

- Examine bird characteristics
- Make predictions on which birds are most suited to the changing climate based on student research of habitat, migration routes, food resources and historical data

Vocabulary:**Adaptation**

A specific structure or behaviour that helps an organism survive and reproduce in an environment

British Columbia PLO's:

Science 6, 7, 8

Background:

In this activity students will explore bird adaptations and make predictions about what birds will thrive in the future in the face of global climate change, and which are not likely to be able to adapt. This is an advanced activity that is somewhat complex and requires students to have independent work skills, and be able to use computers to search the internet. The lesson can be done with less independent classes but more preparation will need to be done before the class to gather the information.

This is a good activity to do after some discussion on abrupt climate change, and the impacts that it will have on marine and coastal environments have been covered. The students will be able to contribute the most if they have a good understanding of the global impacts of climate change and how those will affect specific ecosystems and organisms. The students will synthesize a number of concepts and ideas that are covered in a abrupt climate change unit.

If you do this lesson in early December or early February you may be able to time the lesson with participation in either the

Christmas Bird Count or the Great Backyard Bird Count, respectively.

Global climate change is going to affect many different organisms. Birds are just one of the many groups that will be impacted by all the many changes that come along with warming waters and altering ocean climates.

Birds are an amazing group of animals that often under appreciated by many. All birds are in the Class Aves, with over 9,600 species. Birds have very unique adaptations that allow them to live in every terrestrial biogeographic region on earth. Birds have hollow bones for light-weight flying, horny bills (lighter than teeth) for eating, and feathers as strong waterproof insulators.

Some birds are very specialized and may be susceptible to changes in the environment. Many species are already in decline due to changing habitat, less food resources, increased competition and so will be further threatened by the changing climate. These bird species will likely decrease in numbers and distribution, and some will become extinct due to global climate change over the next century.

Other birds are generalists and may be able to adapt to the changes much better by altering their habitat and food sources. Birds that can utilize many food resources, have large

distributions, and adapt to new environments will continue to live in a changing climate. Seagulls, crows, and ravens are just a few groups that we all know and recognize as being widespread and able to live in a variety of locations.

Materials:

- Bird books
- Bird posters
- Bird images from magazines
- Markers
- Poster paper
- Access to computers
- Journals/notebooks
- Computers with internet access
- Printouts of images of predicted global temperature and rainfall changes

Optional

Binoculars
Spotting scopes
BBC *Life of Birds* movie
Internet connection with projector for classroom viewing of CBC

Procedure:

1. Read the *What about the birds* article in *Ocean News* as a class or individually.
2. Have the class list the bird species that are found in the local area. If you have any bird books or local bird posters have the students start a bird list of species they have seen.
3. As a class compile a list on the board of the what makes birds unique (i.e. bill for eating, feathers, ability to fly, feet for pecking or swimming, hollow bones, egg laying). Review how birds are related to other organisms including humans in terms of kingdoms, phyla and classes. The Tree of Life website can be a good source, as well as Wikipedia.
4. In small groups have the students look at the species named for the area and images of birds and list the adaptations that allow

- birds to thrive in different environments: temperature tolerance, food choice, nesting sites, colour/camouflage, nest sites, incubation periods, migration, defense/warning systems etc. Have a recorder in each group write down the ideas.
5. Back together as a class ask the students how climate change will affect seabirds and shorebirds specifically. Ask them to consider the topics in the *Ocean News* article including coastal habitat, fish and plankton populations, storm frequency, etc.
 6. Break the class into small groups that will look at specific species of birds and how they might be affected by climate change.
 7. The groups will look at four areas for each bird species they examine: habitat, migration routes, diet and historical data to come up with a prediction on the fate of the species. By combining the data they will make predictions about how their birds will thrive, survive or decline over the next few century during abrupt climate change. Depending on the class you may want to choose the bird species in advance and prepare some of the information in a condensed folder to minimize time spent on searching. Place the instruction page on an overhead or projector so that they students can see them and go over what the categories they will be examining are.
 8. Place the instruction sheet on an overhead or hand it out to the students to keep the students on track.

1. Habitat

How the bird's winter and summer habitat change in terms of temperatures and precipitation over the next few decades, centuries due to climate change will greatly affect the survival of the birds. Ask the students to consider if the birds have very specialized habitat needs, or live in a variety of areas.

2. Migration routes

Remembering that the birds will stop along the way and rely on these regions in order to complete their journey how will the areas used during migration be affected by climate change? The students need to take into consideration temperature and precipitation changes, but also increased storm intensities, rising sea levels, other abrupt climate change impacts.

3. Food supply and specialization

Food resources will also greatly influence bird survival. Have the students compare the birds being studied to the images of the birds bill adaptation chart. Ask the students to consider if the bird's prey species are at risk or not when making their predictions about bird survival. Are they specialist or generalist eaters?

4. Historical data

The Audubon Society has been conducting Christmas Bird Counts since 1900. During this time data on bird populations and distributions have been collected and entered from across North America. Their website has a great tool where you can create graphs for bird species that have been observed over the years, the numbers observed and their locations. Have the students create and examine the maps and graphs for their bird species in North America. Have them look at how the observations have changed. The students should incorporate this data into the predictions on whether or not the species will thrive or struggle over the next several decades.

www.audubon.org/bird/cbc/hr/index.html

9. Have the students work on their species for the remainder of the class and finish any necessary components as homework.

Next Day

1. Have the groups create a presentation that will share their ideas with the rest of the class. This can be a short, simple poster or a piece of writing or a skit depending on what you want the focus to be on. This

should include their prediction and a short explanation. Give them approximately 20 minutes to prepare. Presentations should be between 2-4 minutes.

2. Have the groups present their presentations.
3. To end the section, time permitting, watch either the BBC's *Life of Birds* episode (45 minutes), or the CBC's *The Big Melt: A Tale of Two colonies* (8 minutes).

Discussion:

- How will some birds be more suited to a changing climate than others?
- What areas of the world, and thus the birds of that area, will be most affected by climate change?
- What geographic area of Canada will be most affected by climate change that could affect bird populations? What birds depend on this area?
- What other species of birds that are not specifically seabirds or shorebirds but will be impacted by changing ocean conditions around the world due to abrupt climate change?

Extension and Resources:

- Map showing how the temperature is predicted to change around the globe
<http://atlas.nrcan.gc.ca/site/english/maps/climatechange/scenarios/globalannualtemp2050>
- Map that showing the predicted precipitation changes due to climate change
<http://atlas.nrcan.gc.ca/site/english/maps/climatechange/scenarios/globalannualprecip2050>
- The **Christmas Bird Count** is run by the Audubon Society and has been held for over 100 years with participants from across North America.
www.audubon.org/bird/cbc/index.html
- The **Great Backyard Bird Count** takes place each year. It is a great way to start

bird-watching and can be done easily with small groups. www.birdsource.org/gbbc

- Take the class on a birding trip. This can be around the school yard or perhaps to a local bird sanctuary. This will help them learn more about birds and add to their species list.
- Encourage the students to continue their bird lists at home on their own time. Revisit their lists throughout the year and make a class list that can be added to.
- **BBC's *Life of Birds*** is a documentary that focuses on birds around the world and their special adaptations. As a class watch one or several of these 45-minute videos. They all specialize on different aspects of bird life.
- **CBC's *The Big Melt* installment *A Tale of Two Bird Colonies*** is a short clip from a larger series. The 8-minute feature shows two bird colonies in the Canadian Arctic and how climate change is affecting the area. This is a good way to end the class section on birds.
www.cbc.ca/national/blog/special_feature/the_big_melt/
- A good general bird article for the students to read is found in Environment Science News "One in four bird species could disappear by century's end" www.ens-newswire.com/ens/dec2004/2004-12-15-10.asp
- A great webpage that can help students identify birds online is identify.whatbird.com/mwg/ /0/attrs.aspx (it includes images, geographical range, audio clips of their calls).

List of bird species

Here are some of the species that you can use for this activity. This list is composed of seabirds and shorebirds that are found in Canada at least for part of the year.

- Common Eider
- Thick-billed Murre (Brunnich's Guillemot)
- Common Murre
- Common Loon

- Pacific Loon
- Rhinoceros Auklet
- Ancient Murrelet
- Marbled Murrelet
- Ivory Gull
- Glaucous Gull
- Harlequin Duck
- Surf Scoter
- Black Scoter
- Greater Scaup
- Roseate Tern
- Belted Kingfisher
- Black Oystercatcher
- Common Goldeneye
- Pelagic Cormorant
- Bufflehead
- Cassin's Auklet
- Green-winged Teal
- Horned Puffin
- Iceland Gull
- King Eider
- Manx Shearwater
- Sooty Shearwater
- Marbled Godwit
- Lesser Yellowlegs
- Parasitic Jaeger
- Pigeon Guillemot
- Red-necked Grebe
- Red Phalarope

Risk management:

Outdoor activities always involve some risk management. Make sure that while birding students are still being aware of their surroundings and not just focused on looking for birds. If leaving the school property, ensure that all the paperwork and appropriate supervision is complete.

Birding is done best in the mornings. Make sure that the students are dressed for any weather conditions that may occur.