MASSIVE MIGRATIONS

Summary
Students map and calculate the migration routes of arctic species to learn that animals that spend part of their lives in the arctic are connected to other parts of the world for food and shelter.

Grade Level:
3-8; K-2

Time:
one class period

Subjects:
geography, science

Skills:
research, synthesis

Learning Objectives:
Students will be able to:

- ✔ Measure the distances traveled by migratory arctic bird species.
- ✔ Identify arctic species that spend parts of the year in their own local areas.
- ✔ Explain how migratory arctic species meet their habitat requirements in various regions.

Materials:

- ✔ World map, computer with internet connection (if possible);
- ✔ North America Map worksheet.
- ✔ Migration route map if computers not available.

Background

A habitat is the place where a species' requirements for food, water, cover, and places to raise young are found (distinguished from an ecosystem, which is the set of interactions between living and nonliving components in the environment). Migratory birds require three different habitat types: breeding and nesting areas, where they lay their eggs; non-breeding areas (often used to find food, water, and cover); and migratory stopover locations as the birds move from the breeding to the non-breeding areas. Some animals, such as caribou, migrate to areas where food is more plentiful and where they can safely have offspring. The caribou migrate from southern, inland areas of Alaska and Canada to the arctic coastal plain in the summer. High winds on the coastal plain help keep away mosquitoes and warble flies which are parasites of the caribou.

Most arctic wildlife species are temporary residents; they move to more favorable climates during the harshest times of the year. However, some species spend the entire year in the arctic ecosystem. Year-round resident birds such as the ptarmigan, raven, ivory gull, bald eagle, and dovekie have thicker feathers than

PTARMIGAN

migrants such as arctic terns, snow geese, eiders, and sandhill cranes. The best time of year for birds to live in the arctic is during the summer months with long days in which to find food, warm temperatures, and plenty of insects! In May, thousands of birds descend upon the thawing tundra to begin their reproductive cycle. As the top soil layer of the tundra thaws, the remaining permafrost below the surface prevents the melt waters from draining, creating standing pools, called "thaw lakes," and marshy soil. For migratory birds, the process of egg-laying and rearing of young must be a fast one, as the summer months are few and quickly pass.

Most tundra birds lay their eggs directly onto the ground, in a slight depression. Some, like the golden plover, line their nests with vegetation such as moss, grass and leaves. American golden plovers and black-bellied plovers have their young in the arctic during the summer months, then travel about 6,000 miles each winter to South America! They use Texas and other states on the way as a stop-over, to take advantage of warm temperatures and plentiful food before completing their long journey. Flight of the Golden Plover: The Amazing Migration

Check this list to see which bird is an example of a species that summers in Alaska and winters in your state. In addition to these, there are likely many other local species in your area with similar migration patterns.

(Information from: US FIsh and Wildlife Service, (www.fws.gov.), www.r7.fws.gov/nwr/arctic

Alabama - Ruby-crowned Kinglet
Alaska - Redpoll
Arizona - Fox Sparrow
Arkansas - Mallard
California - Snow Goose
Colorado - Bohemian Waxwing
Connecticut - Greater Scaup
Delaware - Black-bellied Plover
Florida - Peregrine Falcon
Georgia - Gray-checked Thrush
Hawaii - Golden plover
Idaho - Short-eared Owl
Illinois - Northern Flicker
Indiana - Dark-eyed Junco
Iowa - Sharp-shinned Hawk
Kansas - Smith's Longspur
Kentucky - Merlin
Louisiana - Long-billed Dowitcher
Maine - Least Sandpiper
Maryland - Tundra Swan
Massachusetts - Golden Plover
Michigan - Oldsquaw
Minnesota - Red-throated Loon
Mississippi - Norther Waterthrush
Missouri - American Pipit
Montana - Golden Eagle
Nebraska - Wilson's Warbler
Nevada - Green-winged Teal
New Hampshire - Dunlin
New Jersey - Canvasback
New Mexico - Sandhill Crane
New York - Semipalmated Sandpiper
North Carolina - Semipalmated Plover
North Dakota - Rough-legged Hawk
Ohio - American Tree Sparrow
Oklahoma - Savannah Sparrow
Oregon - Brant
Pennsylvania - Lapland Longspur
Rhode Island - Horned Grebe
South Carolina - Ruddy Turnstone
South Dakota - Northern Shrike
Tennessee - Yellow-rumped Warbler
Texas - White-fronted Goose
Utah - White-crowned Sparrow
Vermont - Snow Bunting
Virginia - Lesser Scaup
Washington - Varied Thrush
West Virginia - Rusty Blackbird
Wisconsin - Snipe
Wyoming - Townsend's Solitaire

between Alaska and Hawaii, by Debbie S. Miller (1996) is an informative illustrated book about the impressive migration of the golden plover (for grades K-6).

Arctic terns make the longest migration of any species on earth, traveling from the northern arctic to the southern Antarctic each year, a distance of 25,000 miles (40,000 km) total (or about 11,000 miles or 17,700 km each way).

Arctic loons breed on tundra lakes and winter mostly on the U.S. Pacific coast.

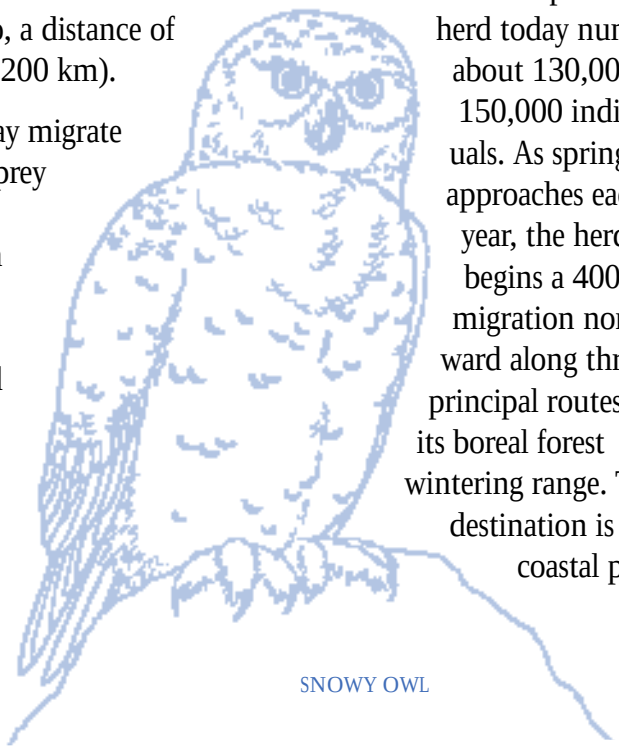
Snow geese nest in the arctic during the summer, traveling from their winter homes in the Gulf of Mexico, a distance of 2,000 miles (3,200 km).

Snowy owls may migrate depending on prey availability—if there is enough prey in their home habitat, they don't need to migrate, but if there isn't enough prey, they will migrate south. Alaska's snowy owls tend to spend autumns in the prairies and marshlands of Canada.

Sandhill cranes breed and lay their eggs mainly in the marsh grasses of the arctic and winter in grasslands throughout the southern and mid-western U.S.

Caribou are well-known travelers across the tundra. These herbivores are attracted to the abundant lichens and grasses of the arctic, and spend winter farther south in the shelter of the taiga's trees. They are excellent swimmers, which is essential since there are many rivers to cross along their way.

The Porcupine caribou herd today numbers about 130,000 to 150,000 individuals. As spring approaches each year, the herd begins a 400-mile migration northward along three principal routes from its boreal forest wintering range. Their destination is the coastal plain of the Arctic National Wildlife Refuge. By mid-May, the first pregnant cows arrive, followed soon by the rest of the herd. Calving reaches a peak in early June. The narrow coastal plain between the Brooks Mountain Range to the south and the Arctic Ocean to the north is ideal for calving and the early nurturing of the young. Thick fields of protein-rich cottongrass provide nourishment. Ocean breezes deter swarms of mosquitoes. Predators in this season are few. The coastal plain is so well-suited for calving that, although it is only one-fifth the size of the calving area used by the Central arctic caribou herd, six times as many Porcupine caribou inhabit it. By early September, the young calves are strong enough to initiate their migration southward and the cycle begins again.
A Caribou Journey, by Debbie S. Miller (1994) is a story of caribou migration, including information on the natural history of caribou, which would complement this activity for grades 3-6.



SNOWY OWL

Procedure

1. Divide students into small groups and have them visit the FWS's arctic National Wildlife Refuge website

(http://www.r7.fws.gov/nwr/arctic/) to find your state and others around it and discover which bird species winter in your area and summer in the arctic (if no website access is available, refer to the background section's list of states and migratory bird species or use library resources). Have each group choose one species, and make sure each group has a different species to research. *What does their species eat? What are its habitat requirements for food, water, and cover, and places to raise young? How far does it migrate? What challenges do they face?*

2. Have students, in their groups, calculate the distance traveled by the species they have selected and make a list of the places it travels through. *What are the habitat requirements that are met by each place/stopover?* On the map of North America provided to students on the worksheet (p.55) and using colored pencils, have students chart the path that their species travels on its route to and from the arctic region.

3. Compare the distances of different species' migration routes. This could be done by creating charts and graphs, or to scale outside, using string and tape measures. For example, one foot on the schoolyard could equal 100 miles (or whatever increment makes the most sense) traveled by the selected species. Have students lay out their migration route on the schoolyard to compare. *Which species has the longest migration? The shortest? What kinds of ecosystems do they pass through? Why do you think birds would travel on these long journeys? What makes the journey worthwhile for them? Why not just stay?*

4. Have each group of students demonstrate their species' migration route to the class. Students may create props or geographic landmarks to symbolize what their species might encounter on their migration. Give them time to create skits or mime acts to illustrate all the challenges and activities their species will encounter along the way. For example, to illustrate the difficulty of the journey, students may perform their migration hopping on one foot. Or at each stopover point, students could perform a task such as arranging leaves into the shape of a nest or attempting to reproduce the call of their species. Encourage the non-performing students to ask questions of each group during and after their presentation.

5. Explain that in addition to birds, other kinds of animals migrate as well. If time allows, have students research the migration route of the arctic's caribou herds. For more information, visit NWF's Arctic Refuge page: (www.nwf.org/arcticrefuge/)

Modifications for Younger Students (K-2)

✔ Have students cut out tracks of migrating species. You may find these in field guides. These can be taped to the floor, perhaps in a gymnasium. Have small groups of students follow the trail of one or more species, performing tasks that their species might need to do along the way, for example catching fish using a play fishing set, and building shelter/dens by stacking square cardboard boxes. They could imitate the appropriate bird calls or songs along the way. If possible, they can answer questions or learn more about a related topic (such as nest making) along their migration.

Extension

✔ Research the habitat requirements of migratory species found in your area. Check your schoolyard to see if there are migratory species present, and what microhabitats exist that meet this species' needs. *In which seasons are you most likely to see these species? How could you change your schoolyard to make the habitat more inviting for visiting migratory species? Does your local migratory species have adequate habitat is the size of its habitat growing or declining? Why? What environmental quality challenges do these species face?*

✔ Discuss and investigate how disruptions along a migratory route could affect the survival of the species. A common problem for migrating birds is development, and thus loss of habitat. This concept could be built into the activity above, by introducing obstacles along the students' migratory route, or eliminating one of the students' critical habitats along the path to see what would happen.

✔ Discuss and investigate how birds know when and where to migrate. *What are the signals they look for? How do they navigate?*

Assessment

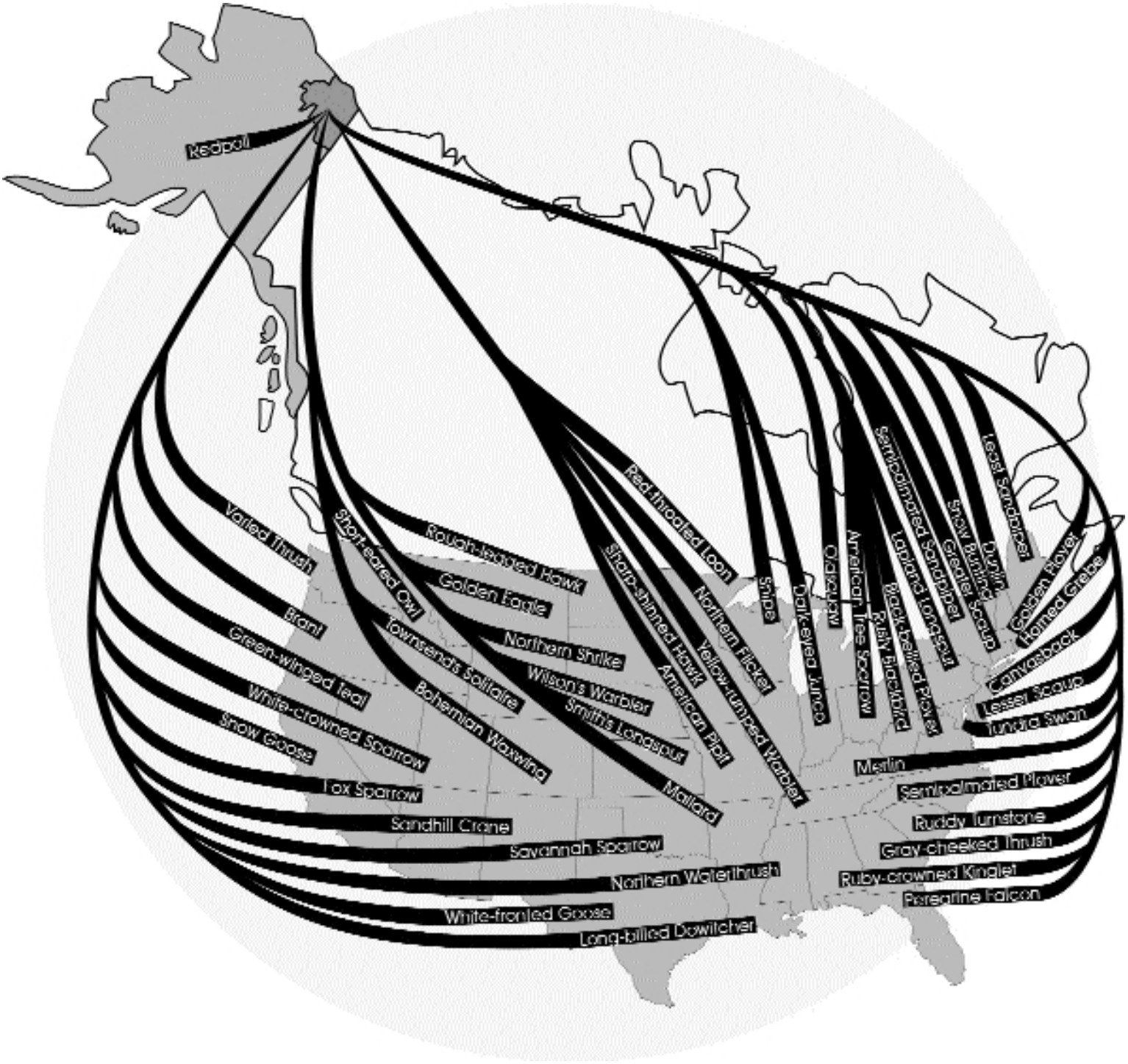
✔ Assign students different migratory arctic species from the ones they originally studied. Have them determine their routes of migration, calculate the approximate distances they have to travel, and describe how they meet their habitat requirements along the way.

WORKSHEET


Artic Ocean
U.S.A.
Beaufort Sea
ICELAND
GREENLAND
Baffin Bay
Labrador Sea
Hudson Bay
CANADA
U.S.A.
Atlantic Ocean
MEXICO
Gulf of Mexico
BAHAMAS
CUBA
JAMAICA
HAITI
Caribbean Sea
Pacific Ocean
COSTA RICA
PANAMA
VENEZUELA
GUYANA
COLOMBIA

WORKSHEET

SAMPLE ARCTIC MIGRATORY BIRD SPECIES



SOURCE: U.S. FISH AND WILDLIFE SERVICE