

MIGRATION

OVERVIEW

With information received from other participants, direct observation, the use of maps and known distances, the students will establish the route and the distance traveled by the Monarch Butterfly during its migration.

BACKGROUND

Migration can be defined as the periodic movement of an animal from the place where it lives to a new area with a subsequent return trip to its original home.

Animals migrate because of changes in their habitat such as lack of food, adverse weather conditions or because of special needs in their life cycle.

Animals that migrate have the capacity to move easily and generally use the same migratory routes. Depending on the animal, the routes can be by land, water or air. Migratory animals include birds, fish, mammals, reptiles, amphibians, and insects.

Animals that migrate over land must be able to travel long distances, and often have to cross wide rivers or climb very tall mountains. The swimmers, like salmon and whales, must struggle against currents in order to stay on course. They need strong muscles for that purpose.

Those that travel by air such as birds, bats and insects, like the Monarch Butterfly, encounter fewer obstacles, but most of them avoid long sea voyages or flying too high.

LEVELS

Grades 4-12

SUBJECTS

Elementary: Geography, Math, Language Arts.

Middle School: Math, Geography, Language Arts, Physics.

High School: Reading and Writing Workshop, Biology.

CONCEPTS

- Organisms are interdependent and depend on nonliving components of the Earth.
- Organisms adapt to changes in the environment according to the genetic and behavioral capacity of their species.

SKILLS

Observation, Teamwork, Information Gathering, Writing, Communication, Analysis, Categorization of Information, Hypothesis Forming, Synthesis, Utilization of Maps.

OBJECTIVES

The students will determine the route and distance traveled by the Monarch Butterfly during its migration.

MATERIALS

A big map of North America (Canada, US and Mexico), a tourist map (with road distances) of the states traversed by the Monarch, pictures or any colored illustrations of the Monarch Butterfly.

LENGTH OF TIME

Three months

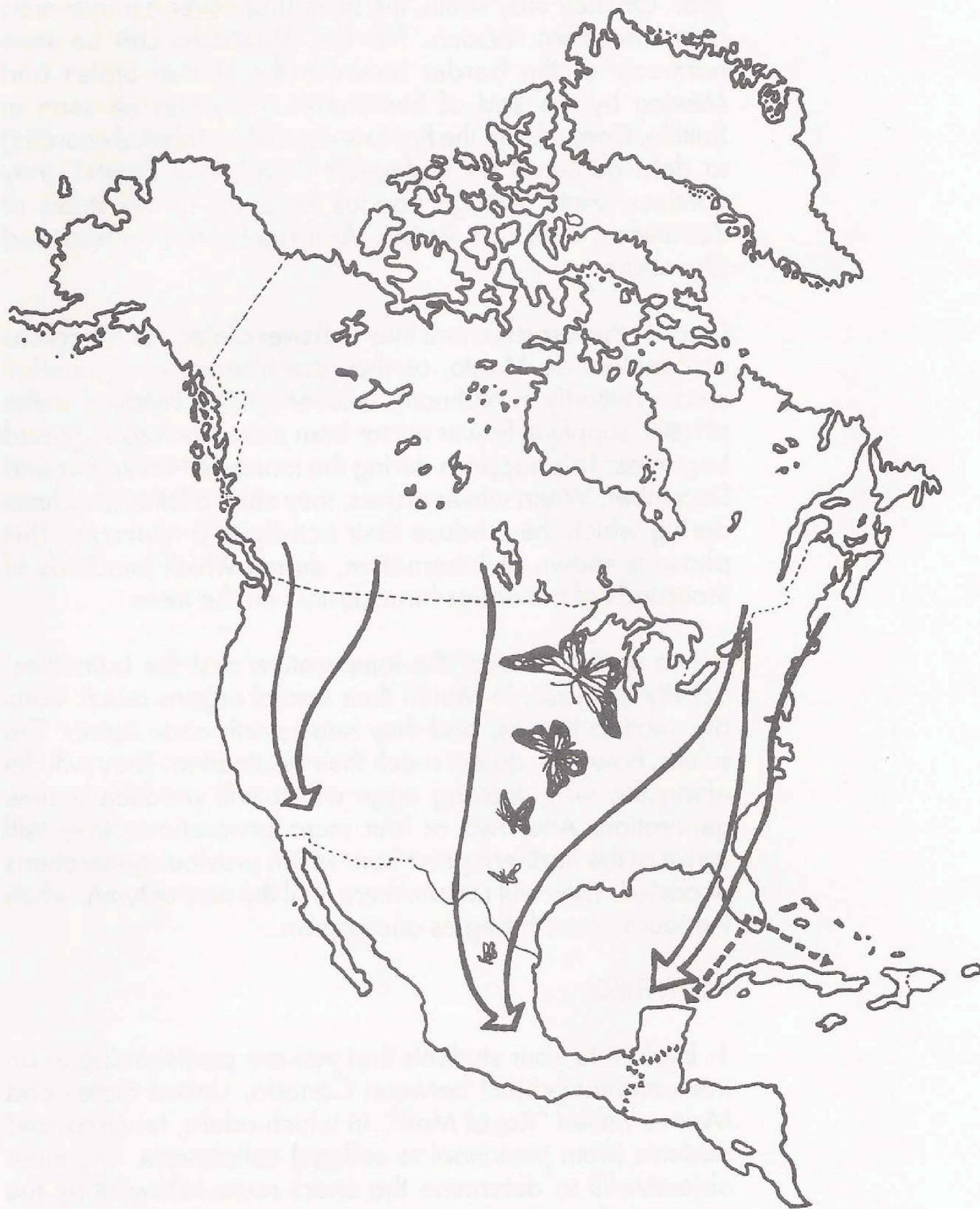
Migration of the Monarch Butterfly

The Monarch Butterfly is native to the North American Continent. It has also established itself in Hawaii, Samoa and Tahiti, as well as Australia and New Zealand, transported by ship or carried by the wind. The largest population is located in southern Canada and northern United States, from where it migrates every year. This interesting phenomenon begins every autumn as daylight hours shorten and temperatures fall, and the flowering plants on which these butterflies feed become dormant. The generation of butterflies born at the end of the summer undergoes hormonal changes which will inhibit the maturation of their sexual organs and prolong their lives up to eight months. Their migratory instinct is then awakened. The fat accumulated during the caterpillar stage will serve as an energy reserve to travel 2,500 to 3,000 miles. Depending on the wind, the butterfly will travel at a speed between 10 to 15 miles per hour for six to eight hours a day.

The trip south can follow three different routes. For the Monarchs that live west of the Rocky Mountains, migration will be to the state of California, near Santa Cruz and San Diego. Those that spend their summer between the eastern side of the Rockies and the Great Lakes, fly to México and overwinter in the states of México and Michoacán. The Monarch population that lives between the Great Lakes and the Atlantic Coast take the third route, through the Carolinas and Florida, and reach as far as the Yucatán Peninsula also in México. The exact place where they overwinter continues to be a mystery. The most important route because of the number of butterflies (100 – 150 million) leads to the Oyamel Forests (Douglas fir), located high in the mountains which form the neovolcanic ridge of México.

There are various hypothesis about how the Monarch Butterfly finds the same overwintering site year after year. One suggests that because of the magnetic material in their head and thorax, they can detect the magnetic differences that exist in the mountains with mineral deposits, as in the case of the states of Michoacán and México.

FALL MIGRATION AND OVERWINTERING AREAS



Another hypothesis holds that they are guided by the polarization of the sun's rays which varies throughout the calendar year. On their way south, the butterflies cover a major area of northeastern México. The first Monarchs can be seen northeast of the border between the United States and México by the end of September. They can be seen in Saltillo, Coahuila, in the first few days of October. According to data gathered by Profauna's Royal Mail Project, they continue south through various locations in the states of Zacatecas, San Luis Potosí, Aguascalientes, Jalisco and Querétaro.

Once in the forests where they will overwinter, the Monarchs or Papalota de Monte, as they are also known, (papalotl means butterfly in Nahuatl), recover quickly, feeding on the plentiful supply of flower nectar from plants such as sage and begonias. This happens during the month of November and December. When winter arrives, they enter a lethargic phase during which they reduce their activity to a minimum. This phase is known as hibernation, during which hundreds of thousands of butterflies form clusters on the trees.

When spring arrives, the temperature and the butterflies' activity increase. In March their sexual organs reach maturity, mating begins, and they head north once again. The adults, however, do not reach their destination. They will die along the way, leaving eggs which will produce a new generation. After two or four more generations, they will arrive at the northern point from which previous generations departed. They will remain there until the next autumn, when the journey south begins once again.

ACTIVITIES

1. Explain to your students that you are participating in an international project between Canada, United States and Mexico called "Royal Mail", in which adults, teachers and students (from preschool to college) collaborate. The main objective is to determine the exact route followed by the Monarch Butterfly during its migration, and with the information gathered, create programs for their protection.

2. Explain to your students that during the Monarch's migration period, the Royal Mail participants will exchange information, and to achieve the proposed objective, it is important to do the following:

- Become familiar with the Monarch Butterfly by studying photographs and illustrations in order to recognize it with accuracy.
- Be alert to their arrival in the community. The students who see them must write down the date, time, place and weather conditions (sunny, cloudy, cold, etc.) and discuss this information with their classmates.
- When the Monarch arrives in their community, they should notify PROFAUNA, A.C., at Apartado Postal 486, Saltillo, Coahuila, Mexico, C.P. 25000.
- As they receive information about other places and dates when the Monarch Butterflies were seen, they should mark them on a map in order to begin tracking their route.
- They should determine the miles covered per day, using known distances between one place and another (maps in which distances are indicated can be obtained from tourism offices).
- Students will be notified when the Monarchs arrive at the sanctuary. Their arrival should be indicated on the map the class has been using to show the migration route.

3. Having completed those tasks, the class should trace the trajectory directly on a map of North America, from its starting point in Canada to its conclusion in Mexico.

4. Next, ask your group to analyze the compiled data and draw conclusions on the migration pattern, for example: What route did the butterflies follow? How long did they take to complete it? How many miles did they cover? What was the average distance traveled daily? Did the weather affect their journey? Develop a hypothesis in relation to this point. Once the analysis is completed, ask them to write a report and send it to PROFAUNA A.C. They will receive a general report by mail containing data from all the participants.

5. Ask your students to find out the following information about each state that the Monarch passes through during its migration:

- Major cities, territorial extension, major geographic points (mountains, rivers, etc.), principal type of vegetation, weather conditions during migration, fauna, and any other interesting information.

With the data obtained, they can hypothesize about:

- The length of time it will take to move through the state, possible trees where the butterflies may rest, risks which the butterflies may face (rains, lack of adequate shelter), miles covered daily.

6. Ask the students to provide a description of the places the butterflies overwinter in the Neovolcanic Axis, as well as an estimate of the time that the Monarchs will remain in their sanctuary.

ADDITIONAL ACTIVITIES

1. Write articles for the school's newspaper or bulletin board to inform the students of the butterflies' trajectory, highlighting their stay in your community. Organize a festival welcoming the Monarchs to the community.

2. At the end of the research project, design a poster or mural which provides the information gathered through direct observation and exchange, emphasizing the school's participation in an international project.