OVERVIEW

About the Workshop

The Journey North migration investigations provide an exciting way for students to explore the changing seasons through observing animal migrations. Through this workshop, participants will learn to use the migration investigation for monarch butterflies. By learning about one of Journey North's featured migrations in detail, participants will be able to adapt activities for other migrations. The video gives an overview of the various migrations activities and shows how some experienced Journey North teachers use the program. Participants will take part in a hands-on simulation that models activities for students.

Objectives/Outcomes

After going through this workshop, participants will be able to:

- describe the basic elements of the Journey North migrations and monarch butterfly investigations,
- implement the migrations activities at their schools,
- demonstrate how prediction can be used as an important part of science teaching and learning, and
- match Journey North activities to district, state, or provincial standards.

Materials You May Need

For the facilitator:

- VCR and television monitor
- overhead projector, blank transparencies, and markers
- flip chart and markers
- extra paper
- computer with Internet connection (optional)
- large photo or drawing of a monarch butterfly (could be slide, overhead transparency, or poster)

For the participants (handouts are provided as blackline masters within this guide):

- map of North America with states, provinces, latitude and longitude lines, and a distance-scale bar (p. 25)
- Migration Route Prediction Chart handout (p. 24)
- Sample Monarch Migration Data handout (p. 26)
- Migrations Scavenger Hunt handout (p. 27)
- string or thread (for measuring on map)
- atlases or political maps of North America

NOTE: BEFORE GOING THROUGH THIS WORKSHOP, PARTICIPANTS SHOULD HAVE WATCHED VIDEO MODULE ONE—INTRODUCTION TO JOURNEY NORTH.

Key Concepts for the Facilitator

Although this workshop focuses on monarch butterflies, Journey North follows the annual migrations of about a dozen animals including robins, bald eagles, hummingbirds, manatees, and three species of whales. In a unique partnership, classes can join other students and scientists to gather and analyze data about these fascinating migrations. The workshop activities can be implemented with any of the Journey North migrations, not just monarch butterflies.

Every spring, millions of monarch butterflies re-populate eastern North America after surviving the winter in the high mountains west of Mexico City. The monarchs fly up to 2,500 miles to get to Mexico in the fall and spend the winter living off their fat reserves. In March, with just a few weeks to live, the butterflies leave Mexico to produce the next generation. From March to September, there are four to five short-lived monarch generations. In the fall, by instinct alone, the great-great-great grandchildren of the previous fall's butterflies migrate to the very same mountain sanctuaries in Mexico. The information for this incredible journey is somehow passed from generation to generation so that miraculously, the butterflies find a place they've never seen before.

The monarch migration is an endangered phenomenon. It is a classic conservation dilemma seen the world over: growth of the human population and the increasing use of resources degrades and destroys the habitat of other species. Through their participation in Journey North, students are motivated to learn more about the complexities surrounding many endangered species and phenomena like the monarch migration.

Prediction, an important science skill, is one of the key elements of the migration investigations. Students learn to make predictions, gather data, analyze it, look for trends or patterns, and then adjust their predictions. Through this continuing cycle, students learn to make more accurate predictions and develop hypotheses based on scientific data.

Challenge Questions are central in the migrations studies as with all other Journey North investigations. (See discussion of Challenge Questions in the workshop activity "Journaling and Using Journey North Challenge Questions" on page 5.)

The monarch activities are interdisciplinary and can be used by self-contained elementary classroom teachers or by specialists who teach single subjects. Science, math, geography, language arts, and art are all part of the Journey North investigations.

BEFORE WATCHING THE VIDEO

ACTIVITY A – What Do You Know About Monarchs and Migration?

The inquiry cycle starts with observation of a phenomenon. Thus, if at all possible, teachers should start the investigation of monarchs by giving students an experience with live monarch butterflies, in the classroom or in the field. Teachers would instruct students on the proper handling of monarchs, pass them out to the students, have the students make observations, and then ask the students to formulate questions. In primary classrooms, the teacher would simply write down the questions heard during the students' observation activity.

If possible, start this activity by first recording observations of live monarchs (or of another species of adult butterfly, a caterpillar, a chrysalis, a butterfly wing, etc.). When participants have finished, ask them to take a minute or two to jot down as many questions about monarchs as they can. Then have them share their questions. List them on the board or on an overhead. Examples of questions might be:

- What do monarch butterflies eat?
- How far north can monarch butterflies be found?
- What happens to monarchs in winter?
- What is the life span of a monarch butterfly?
- How far can a monarch fly in a week? A month? A lifetime?

Available on the Web

There are two Web sites where you can find more information about raising and tagging monarchs, and about classroom investigations with monarchs:

Go to:

Monarchs in the Classroom
www.monarchlab.umn.edu

and

Monarch Watch
www.MonarchWatch.org

Have participants break into small groups and discuss their questions. Which questions could be answered by doing an experiment? Which could be answered by analyzing data? Which could be researched? After a few minutes, bring the group back together and ask groups to share their ideas. You may want to categorize the list of questions that were generated earlier in the activity.

Point out to participants this type of activity can be used with students in a number of ways:
- Student-generated questions based on natural phenomena are an important step in the inquiry process.
- The questions students ask can help teachers establish a baseline of students' prior knowledge.
- The questions can help teachers identify misconceptions students might have.

Have participants share any techniques or strategies they use to generate student questions and to determine students' prior knowledge.

ACTIVITY B – Predicting the Monarch's Spring Migration Route

Hand out maps of North America and Migration Route Prediction Charts (pp. 24 and 25) to all participants, but have them work in pairs for this activity.

Tell participants that their task is to predict the route of the monarch migration from Mexico, as the butterflies enter the United States in March. They can mark the route on the map if they wish. Have partners list the states by order of arrival on the left side of the Migration Route Prediction Chart. (The prediction chart has spaces for predicting the arrival in 15 states. If you are pressed for time, 10 states are sufficient for participants to see the pattern.) While working, participants should think about and then answer:

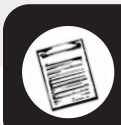
CHALLENGE QUESTION #1:
"Why do you think the monarch migration will arrive in the states in the order you predicted?"

After pairs have completed the task, bring the entire group back together and discuss their predictions.

Explain that they will be exploring the migration route further in a later activity, "Mapping and Analyzing Monarch Migration Data" (pp. 20-21).

Workshop Tip

Allow participants to explore the Challenge Questions on their own rather than just providing them with the answers.



BLACKLINE MASTERS FOR THESE HANDOUTS CAN BE FOUND ON PAGES 24 AND 25.

Workshop Tip

This workshop incorporates several Challenge Questions that are part of the Journey North investigations. If you didn't use the activity "Journaling and Using Journey North Challenge Questions" (page 5) in your introductory workshop, you may want to incorporate it as part of this workshop.

OPTIONAL ACTIVITY – The Annual Cycle, Life Cycle, and Migration of the Monarch

Draw a blank KWL chart on the board or on an overhead. Title it "Annual Cycle, Life Cycle, and Migration of the Monarch." Ask participants to provide information they already know about the annual cycle of monarch butterflies. What do they want to find out? What questions do they need to answer?

Have participants work individually, in pairs, or in small groups. Challenge them to describe the annual cycle of the monarch population—where monarchs are found and what is occurring over the course of a full year. Have participants begin their annual cycles in August so that the cycles can be compared later.

To be complete, their annual cycle descriptions will need to show an understanding of the life cycle of the individual monarch (from egg, to larva, to adult), as well as the migration patterns of some monarch generations. As part of their descriptions, they can include a calendar, make a map, or draw a diagram.

Bring groups back together and have them share their annual cycle, life cycle, and migration descriptions. Explain that this is an activity that could be used with students throughout their study of monarchs (or other migrations). They can fill in or change their descriptions as they learn more about the species. This type of ongoing activity is a variation on KWL.

You may want to share this simplified overview of the annual cycle with participants at the end of the activity.*

August and September: The last monarch generation of summer emerges as adult butterflies and begins to migrate to Mexico. (To keep track of generations, we'll call this the "parent" generation.)
August to November: Fall migration to Mexico.
November to March: The parent generation overwinters at the sanctuaries in Mexico.
March: Spring migration. The parent generation leaves the Mexican sanctuaries.
March and April: The parent generation migrates as far as the southern U.S. states and lays eggs.
April and May: From these eggs, the first spring generation (children) emerges as adult butterflies and migrates northward laying eggs.
May and June: The second generation (grandchildren) emerges as adults and lays eggs.
June and July: The third generation (great grandchildren) emerges and lays eggs.
July and August: The fourth generation (great-great grandchildren) emerges and lays eggs.
August and September: The fifth generation (great-great-great grandchildren) emerges and the cycle continues....

* This overview is for general understanding only. Timing of the annual cycle will vary from year to year, and timing is always different in different geographic regions. There is also substantial overlap between generations. Taken together, this means there may be as few as three or as many as five generations produced during one summer breeding season, depending on the location and the year.

WATCHING THE VIDEO

What You'll Be Watching

Video Module Two—Seasonal Migrations: Monarch Butterflies (running time approx. 18 min.)

Although Journey North provides the opportunity for students to track the migrations of about a dozen animal species, the video focuses on the migration of monarch butterflies.

Although not part of the Journey North activities, many teachers have integrated raising monarchs into their curriculum. The butterflies are tagged and released, beginning their long journey to Mexico. Some students also explore monarch biology through experiments that they devise from questions that they have generated.

Another way for students to learn about the monarchs' migration is through Journey North's "Symbolic Monarch Migration." Students make paper monarch butterflies and send them, as ambassadors, to the children of Mexico. The students in Mexico protect the butterflies for the winter and return them in the spring. Personal letters are exchanged between the students.

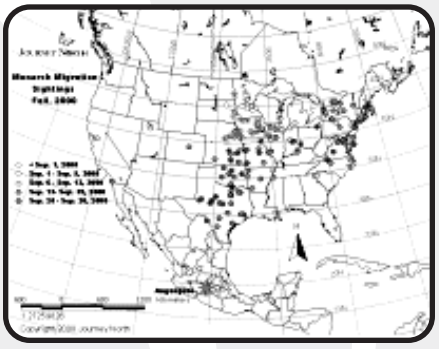
Millions of monarchs cover trees and fill the skies in Mexico where the insects spend their winter. Students experience the beauty and excitement of the winter sanctuaries through reports from monarch experts that are filed on the Journey North Web site.

The video follows how teachers and classes track the migration, report their own sightings, and analyze data. Interviews with teachers and educational experts provide insight into the pedagogy behind the Journey North program.

Suggestions for Watching the Video

Before showing the video, you may want to suggest things for the participants to look for as they watch. This will focus their viewing and help generate discussion afterward. For instance:

- Watch for specific activities that engage students.
- Watch for interdisciplinary aspects of the monarch migration activity.
- Watch for examples of teachers functioning as facilitators for student learning.
- Watch for examples of classes working with Challenge Questions.



After participants have watched the video, you can discuss some of the things that participants watched for, and you may want to use some of the following questions to generate additional discussion. You will want to pick and choose questions based on your particular audience.

• What questions do you have about the monarch migration? (Some of the questions will be answered as participants work through the workshop activities.)

• What science skills did you observe that are taught or reinforced by the monarch investigations?

• How did the students and teachers in the video compare to your students and the way you teach science? Similarities? Differences?

• What did you see in the video that you thought might be interesting to try with your students? Why do you think it is worth trying?

• What are the advantages of an investigation like migrations that runs over an extended period of time? What are the disadvantages?

• Hubert Dyasi suggested that students report from time to time about the progress of their work. How do you incorporate this activity into your teaching?

• Many of the activities in the migrations investigation have cross-curricular applications. How could you facilitate cross-curricular or team teaching in your school?

• What was the most interesting part of the video to you? Why?

• If you have already participated in the Journey North migrations investigations, what tips or recommendations could you give that would help a teacher new to Journey North?

• Where would the Journey North migration investigations fit into your science curriculum?

AFTER WATCHING THE VIDEO

ACTIVITY C – Mapping and Analyzing Monarch Migration Data

A BLACKLINE MASTER FOR THE SAMPLE MONARCH MIGRATION DATA HANDOUT CAN BE FOUND ON PAGE 26.

Provide participants with the Sample Monarch Migration Data handout (p. 26). Have partners plot the data on their maps and complete the right column of the Migration Route Prediction Chart, provided in Activity B.

Next, have participants answer Challenge Question #2 in their journals.

CHALLENGE QUESTION #2:
"How did your predictions compare to the actual results? Did anything surprise you? If the monarch migration pattern was different than what you predicted, can you think of reasons why? Describe what happened and why."

Bring the group back together and discuss their answers. Point out that the Challenge Questions model good scientific thinking, and they are the types of questions students should begin to ask themselves.

Now take a closer look at the migration pattern. Tell participants to note that on March 26, a monarch was sighted in Demorest, Georgia—a long way from Mexico. Have the partners measure the distance on their maps from the monarch sanctuaries in Mexico [19N, –100W] to Demorest, Georgia [34N, –83W]. If participants ask if butterflies fly over the Gulf of Mexico, tell them that scientists do not believe so. (Depending on the tools available, answers will vary. The actual distance from the monarch sanctuaries in Mexico to Demorest, Georgia is 2,367 km [1,471 miles].)

Have pairs find the answer to Challenge Question #3.

CHALLENGE QUESTION #3:
"If the butterfly seen in Georgia had flown straight north from the sanctuaries in Mexico, where would that butterfly have been on March 26?"

ANSWER:
Near Valentine, Nebraska [43N, –100W]. Answers may vary depending on the detail level of the maps used. Remember: no "wrong" answers. If some answers seem way off, ask participants to explain how they determined the location.

Next, after participants have found the answer, have them answer Challenge Question #4 in their journals.

CHALLENGE QUESTION #4:
"Why does it appear that the migration moves eastward after entering the U.S. instead of directly northward from Mexico?"

ANSWER:
Could include: In March, the monarchs would be in danger of freezing temperatures in Nebraska and other northern areas. There would not be milkweed [for butterflies to lay their eggs]. There would be no flowers [with nectar for the butterflies to eat]. In the area where monarchs arrive in March, their habitat is ready. Spring temperatures are usually above freezing and plant development is more advanced.

Bring the group back together to discuss their answers to Challenge Question #4, and to discuss the entire activity. What parts of the activity do they think would appeal to students? If you have a number of more experienced Journey North teachers, what kinds of classroom management tips and suggestions can they provide to less experienced or new Journey North teachers?

Reinforce the importance of using prediction as a part of the overall instructional strategy. What strategies or techniques do participants use in their classrooms to encourage students to predict outcomes and test their predictions?

Available on the Web

There are valid data, questionable data, and invalid data. How do you help students learn to distinguish them?

Journey North carefully reviews all data submitted over the Internet for quality control purposes and often contacts observers to confirm data accuracy. However, Journey North also looks for good opportunities to include examples of accurate—but questionable—data for students to scrutinize.

The lesson "You're the Scientist: Verifying Data Collected by Peers" examines data validity and gives students practice in evaluating data quality. You may want to have participants do the lesson as part of the workshop.

Go to:


the "How to Use Journey North" icon on any page


select the "Classroom Lessons" icon

select "You're the Scientist"

A BLACKLINE MASTER FOR THE MIGRATIONS SCAVENGER HUNT CAN BE FOUND ON PAGE 27.

OPTIONAL ACTIVITY – Migrations Scavenger Hunt

If you have access to a computer lab with Internet access, you may want to have participants explore migrations on the Journey North Web site. Distribute the Migrations Scavenger Hunt handout (p. 27).

Here are some things they should look for:

Seven Things To Look for Among Journey North's Migration Studies

- How many birds, mammals, amphibians, reptiles, and insects does Journey North track?
- What kinds of observations are students asked to report about each species? (Clue: From any species "Home Page," follow the "About This Study" link.)
- Which animals are tracked using satellite technology, and which by students reporting their own observations?
- How many of the species are endangered?
- How many are found where you live?
- Which crossed into Canada first last spring, hummingbirds or monarch butterflies?
- What does Journey South track in the fall?

Six Things To Look for in the Monarch Migration Study

- When was it announced that the monarchs had left Mexico last spring?
- On which date last spring was the first monarch sighted in your state or province?
- Was this earlier or later than the year before?
- Which week last fall did the migration peak in Texas?
- Find a monarch Challenge Question and its follow-up answer, or "discussion."
- Where are the answers from the Monarch Expert, Dr. Karen Oberhauser?

Report Your Sightings

You may want to have participants practice reporting a sighting. Click on the owl icon on any page of the Journey North Web site and follow the directions.

WRAPPING UP

Journey North Implementation Plan

Separate participants into groups of three to five people. Their task is to come up with a plan for implementing Journey North into their current curriculum. If all teachers in the group have used Journey North, then their task should be to devise a plan for expanding the use of the program—doing additional activities, expanding the number of topics, including other subject area teachers, etc. The action plan should include specific steps that the participants can follow when implementing Journey North.

After groups have been given sufficient time, bring the entire group back together to present their ideas to the larger group. List key points on an overhead.

KWL Revisited

Revisit the KWL poster from the introductory workshop. What additions can you make to the chart? Have any questions been answered? Have any new questions arisen? Add to the chart as required.

OPTIONAL ACTIVITY – Correlating to Your Standards

Many school districts, states, and provinces have a set of very specific science standards and curriculum frameworks that teachers must address or fulfill. The activities that comprise the Journey North program fit well with most standards and frameworks. But because each district, state, or province is somewhat different in its requirements, it can be helpful for teachers, curriculum specialists, and administrators to create a correlation that shows how Journey North meets their own requirements.

Separate participants into groups from the same school or district. Using their own standards, groups should create a correlation grid that shows which Journey North activity addresses a specific standard. Participants should focus on the activities from a single Journey North topic, such as Seasonal Migrations, Plants and the Seasons, or Sunlight and the Seasons. Depending on your workshop schedule, groups may begin the process during the workshop and finish it later.

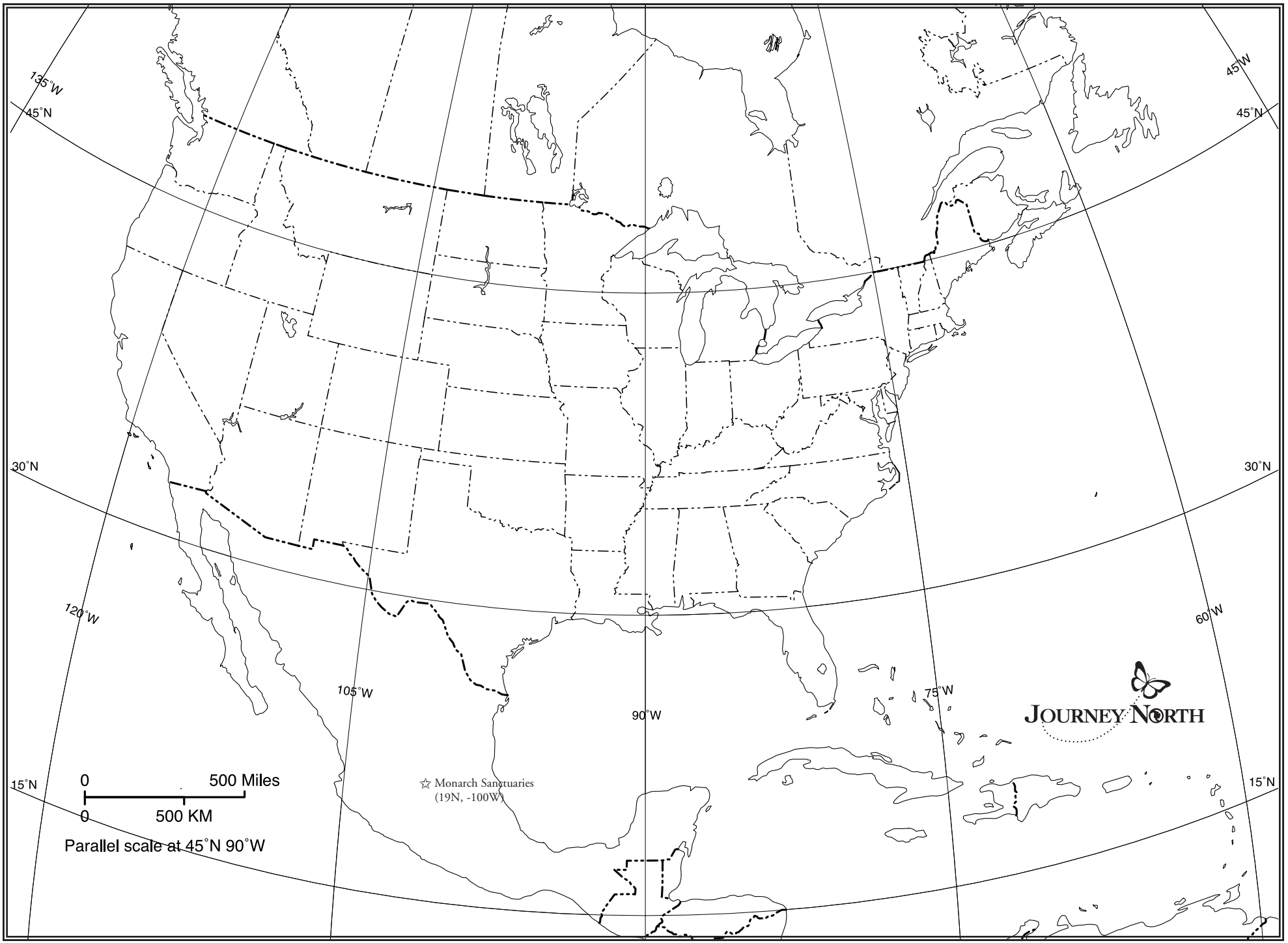
MIGRATION ROUTE PREDICTION CHART

Predict the route of the monarch migration from Mexico, as the butterflies enter the United States in the spring. Name the state where you think monarchs will arrive first, second, third, etc.

	Name of State Where I Predict Monarchs Will Arrive	Name of State Where Monarchs Actually Arrived
1st		
2nd		
3rd		
4th		
5th		
6th		
7th		
8th		
9th		
10th		
11th		
12th		
13th		
14th		
15th		

Challenge Question #1:

"Why do you think the monarch migration will arrive in the states in the order you predicted?"


135°W
45°N
45°W
45°N
30°N
30°N
120°W
60°W
105°W
75°W
90°W
15°N
15°N
0
500 Miles
0
500 KM
Parallel scale at 45°N 90°W
☆ Monarch Sanctuaries
(19N, -100W)
JOURNEY NORTH

SAMPLE MONARCH MIGRATION DATA SPRING 2000

JOURNEY NORTH

These are some of the first monarch sightings received from various states during the spring of 2000. You can plot the data on your migration map or simply use the dates to record the order in which monarchs arrived in each state on your Migration Route Prediction Chart.

Date	City	State	Latitude (N)	Longitude (W)
03/01/00	Austin	TX	30.23	-97.71
03/04/00	Baton Rouge	LA	30.45	-91.19
03/09/00	Clinton	MS	32.39	-90.34
03/10/00	Dauphin Island	AL	30.25	-88.15
03/17/00	Baton Rouge	LA	30.41	-91.15
03/18/00	Ardmore	OK	34.21	-97.17
03/20/00	Texarkana	AR	33.48	-93.92
03/23/00	Tallahassee	FL	30.43	-84.26
03/26/00	Demorest	GA	34.35	–83.36
03/28/00	Piedmont	SC	34.71	-82.46
03/30/00	Wilmington	NC	34.24	-77.95
04/01/00	Powder Springs	GA	33.88	-84.70
04/01/00	Hollywood	MD	38.36	-76.58
04/04/00	Searcy	AR	35.27	-91.85
04/04/00	Perry	OK	36.29	-97.29
04/04/00	Montgomery	AL	32.40	-86.33
04/05/00	Gallatin	TN	36.41	-86.45
04/07/00	Eminence	MO	37.18	-91.48
04/07/00	Seaford	VA	37.19	-76.42
04/07/00	Taylors	SC	34.98	-82.33
04/08/00	Hamden	CT	41.38	-72.94
04/09/00	Smyrna	DE	39.28	-75.53
04/10/00	Grand Tower	IL	37.37	-89.29
04/10/00	Ava	IL	37.88	-89.45

MIGRATIONS SCAVENGER HUNT

Go to the Journey North Web site at www.learner.org/jnorth

Here is what you're looking for:

Seven Things To Look for Among Journey North's Migration Studies

- How many birds, mammals, amphibians, reptiles, and insects does Journey North track?
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- How many of the species are endangered?
- How many are found where you live?
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Six Things To Look for in Monarch Migrations

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- Where are the answers from the Monarch Expert, Dr. Karen Oberhauser?