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Student Lab Sheet

Many scientists conduct scientific investigations in California State Parks. These investigations help solve problems as they preserve and protect park resources. Complete the lab sheet so that you can more thoroughly understand this scientific study at which we will be looking.

SCIENTIFIC INVESTIGATION TITLE

The Research Question:

List some hypotheses that might answer the Research Question.

Predict at least three kinds of data that scientists will need to collect to test the hypothesis.

Identify at least two variables that may affect the yearly data that is collected.

List tools/materials/technology scientists might use to collect their data.

What are some challenges that scientists might have as they try to design an experiment around the hypotheses you listed above?



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Observations and Conclusion

Use this space to write down your observations during the videoconference.

Observations:

After the videoconference, you should be able to analyze this scientific investigation and write some conclusions based on the data, shared information and observations you have obtained.

Conclusions:



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Teacher Lab Sheet

Use your projector, overhead or blackboard to show the name of the **Scientific Investigation Title** and **Research Question**.

Have students fill in the answers to the questions prior to the videoconference. The answers below are only a few examples of appropriate responses. Use the Observations and Conclusions Worksheet to capture observations during the videoconference and for formulating conclusions afterwards.

Scientific Investigation Title

Swainson's Hawk Conservation Project

The Research Question

What is affecting the population numbers of these hawks?

Hypotheses that might explain what is happening in the Research Question

- Their habitats are being developed, so they are losing feeding and nesting sites
- The food they are eating is being sprayed with pesticides.
- Another species is competing with them for habitat more successfully.
- Some type of disease is affecting their numbers.

Data that scientists will need to collect to better understand the investigation.

- Population numbers in Argentina, Mexico, US and Canada
- Observations of main diet in various habitats
- Nesting sites and the number of young being raised
- Migratory routes and timing

Identify variables that may affect the yearly data that is collected

Disease, weather, new habitat loss in feeding and nesting areas, hunting, predators, competing species, cyclic food supplies (i.e. insects)

Tools/materials/technology scientists might use to collect their data:

Binoculars, counters, GPS, cameras, maps, anemometers, thermometers

Challenges that scientists might have

- Communication across continents
- Information collected in some habitats and not in others
- Variety in the experimental designs from one place to another



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Background Information

THE AMAZING MIGRATION OF SWAINSON'S HAWKS

Flying south

The Swainson's Hawk has the longest migration of any North American raptor. Their round-trip flights from breeding grounds in North America to the South American pampas (grasslands) in southern Brazil or Argentina and back, can be as long as 14,000 miles (22,400 km).

The entire population of Swainson's Hawks funnels through the Isthmus of Panama in the fall. Scientists and residents of Vera Cruz, Mexico have named their location "The River of Raptors." Up to a million Swainson's Hawks are tallied during some fall migration counts in this region.

In Argentina, hawk numbers increase throughout November and peak in December, when flocks of many dozen roam the open lands. These raptors stay only for a few weeks before leaving again to fly north.

Each migration can last more than two months.

Flying north

Once the birds have passed through Mexico, they disperse over many routes to get to their North American breeding habitats.

The Borrego Valley Hawkwatch in Anza-Borrego Desert State Park has been recording migration numbers since 2003. The Hawkwatch volunteers and scientists count birds every morning and evening for two months as the birds travel north on their way to their nesting and breeding habitats.

The Anza-Borrego Desert State Park Hawkwatch project has added important ecological information along with population numbers to this international project. Over the years, hundreds of hours have been logged and many observations have helped us to learn more about these amazing birds..

After leaving the Borrego Valley, many of the hawks will stop in California's Central Valley, one of their summer breeding and nesting habitats. Friends of Swainson's Hawks is a citizen group that is working hard to identify and protect important habitat in central California.

The habitat of Swainson's Hawks consists of open and semi-open country – deserts, grasslands and prairies – in both its breeding and wintering ranges. They favor wild prairie, hayfields, and pastures over wheat fields and alfalfa fields, which may offer its prey too much cover. Swainson's Hawks require elevated perches for hunting and a supply of small mammals such as young ground squirrels as prey for their nestlings.

Conservation of this species requires international cooperation and communication.



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Web links

Have your students use the following links to find out five cool facts about Swainson's Hawks.

A River of Raptors! A geographic bottleneck between mountain chains forms a narrow passage of lowlands in central Veracruz, Mexico. This location witnesses the world's largest concentration of migrating raptors that originate in North America and spend the non-breeding season in Middle and South America.

Google map and general info about this amazing hawkwatch location

<http://hawkcourt.org/siteinfo.php?rsite=528>

The Friends of Swainson's Hawks organization is located in the Central Valley of California. Their website has additional information about their conservation efforts and Swainson's Hawks in general.

General biology of Swainson's Hawks in the Central Valley

<http://www.swainsonshawk.org/FAQ.html>

How to identify a Swainson's Hawk

Poster and map of original habitat in California compared to habitat available today

<http://www.swainsonshawk.org/who.html>

Wikipedia article on Swainson's Hawks with migration route

http://en.wikipedia.org/wiki/Swainson%27s_Hawk

The Migration Research Foundation (MRF) is an incorporated nonprofit organization in Canada and the United States, committed to monitoring the distribution and movements of wildlife for conservation research purposes.

<http://www.migrationresearch.org/research/swainson/profile.html>



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Graphing Activity

GRAPHING SWAINSON'S HAWK POPULATIONS

Create two graphs to show the numbers of Swainson's Hawks in (A) Borrego Valley, California and (B) Vera Cruz, Mexico.

GRAPH A

Spring 2003-2011 Borrego Valley Hawk Watch Swainson's Hawks Statistics

Year	Number of Swainson's Hawks
2003	2031
2004	5228
2005	2818
2006	1605
2007	2419
2008	5378
2009	1876
2010	3105
2011	8902

GRAPH B

Fall 2003-2011 Vera Cruz, Mexico River of Raptors Fall Swainson's Hawks Statistics

Year	Number of Swainson's Hawks
2003	1,195,793
2004	980,494
2005	1,200,928
2006	467,533
2007	865,779
2008	569,316
2009	943,428
2010	489,010
2011	683,327

After plotting the populations on your two graphs, interpret the data. For each graph:

1. Based on the graph, write three statements that are true about the hawk populations from 2003-2011..
2. Write three hypotheses that explain the variations in hawk populations that you have graphed.



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Swainson's hawk migration route

Data from USGS, Snake River Field Station, from 30 birds fitted with satellite tracking devices.

Swainson's Hawk Migration Route

