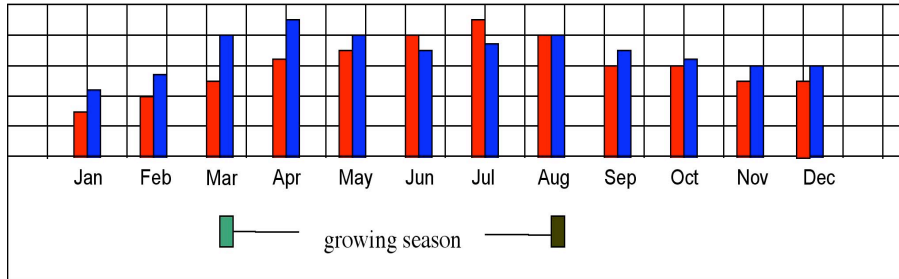
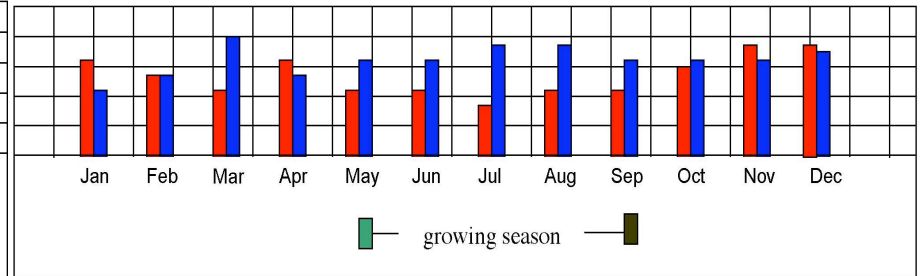


## EARTH SYSTEMS INVESTIGATION AREA - PHENOLOGY/SEASONS GLOBE SAMPLE STUDENT ASSESSMENT TOOL – HIGH SCHOOL

1998 Average Air Temperature and Soil Moisture for Native Site



1998 Average Air Temperature and Soil Moisture for Heath Region

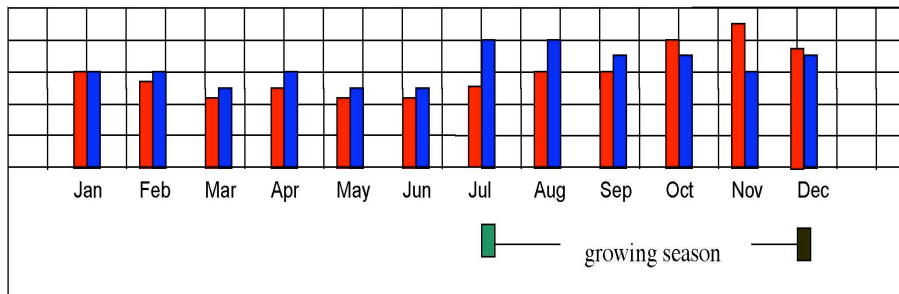


Key

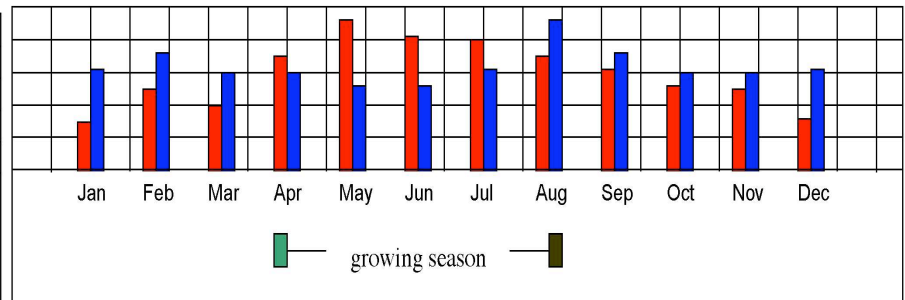
Soil moisture ■  
Air temperature ■

Green up ■  
Brown down ■

1998 Average Air Temperature and Soil Moisture for Barron Region



1998 Average Air Temperature and Soil Moisture for Kinninmont Region



The growing season for a native crop is the amount of time necessary at suitable air temperature and soil moisture levels for growing to occur. In an effort to increase the food supply in overpopulated areas, a group of scientists have proposed trying to plant a crop in several places in the world that have similar environmental and climactic conditions as the area where the crops are native. As a preliminary study, the scientists have been looking for areas that have similar air temperature and soil moisture

conditions. Using the graphs and data above and assuming all of conditions are equal,

- a) answer all of the following questions
- b) write a short report (about 1 page) that discusses the possibility of planting the new crop in any of the regions Heath, Barron, or Kinninmont. Make sure you support your conclusions.

**EARTH SYSTEMS INVESTIGATION AREA - PHENOLOGY/SEASONS  
GLOBE SAMPLE STUDENT ASSESSMENT TOOL – HIGH SCHOOL**

- 1) **(Plan Investigations: Pose relevant questions)** Look at the graph for the native site above. Think of *two* questions you might ask regarding the data that are related to finding other sites that have similar conditions. A sample question might be “At what point during the year does it look like spring is beginning?” Make sure you also say why you think the answer to your two questions might be helpful to you.

Question 1:

Question 2:

- 2) **(Interpret GLOBE Data: Infer patterns, trends)** One of the students in your investigation group, Samantha, suggested that finding trends in graphs is sometimes helpful for analysis. Looking at the bar graph for the native site, what trend do you see regarding the air temperature?

What trend do you see regarding the soil moisture?

- 3) **(Interpret GLOBE Data: Explain data & relationships)** Looking again at the bar graph for the native site, mark where you think each of the four seasons begins and ends. For example, mark “S” for the beginning of spring, “Su” for the beginning of summer, “F” for the beginning of fall, and “W” for the beginning of winter. Make sure you label each of your marks.

How did you determine where to put the marks for each season?

- 4) **(Take GLOBE Measurements: Detect errors; Use quality assurance procedures)** The air temperature and soil moisture data shown in each of the graphs are monthly averages. To find the monthly averages, data was collected by students taking measurements on each day of the month and then calculated then calculated at the end of each month. Since it is always important to show accurate data in your graphs, what are two possible sources of error you can think of in the above method?

Source 1:

Source 2:

**EARTH SYSTEMS INVESTIGATION AREA - PHENOLOGY/SEASONS  
GLOBE SAMPLE STUDENT ASSESSMENT TOOL – HIGH SCHOOL**

How would you make sure that these errors did not occur if you were taking the measurements and calculating the averages?

the measurement is more than the native site, "-" if the measurement is less than the native site, and "." if the measurement is the same as the native site.

- 5) **(Interpret GLOBE Data: Explain data & relationships)**  
Another student in your investigation group, James, mentioned that finding relationships between different variables can be a very useful part of analysis. Looking at all four of the graphs on the first page, what relationship do you see between the beginning of the growing season, or *green-up*, and the air temperature?

Native Site Region	Beginning		End	
	Temp	Soil	Temp	Soil
Heath				
Barron				
Kinnimont				

In the spaces below, write down what indicator you used to determine the beginning of each season. In other words, what told you that it was the beginning of each season?

spring:

summer:

fall:

winter:

- 6) **(Interpret GLOBE Data: Infer patterns, trends; Explain data & relationships)** For the three candidate regions (Heath, Barron, and Kinnimont) mark where you think each of the four seasons begins and ends. For example, for the Heath region mark "S" for the beginning of spring, "Su" for the beginning of summer, "F" for the beginning of fall, and "W" for the beginning of winter.

Once you have marked each map, fill in the chart below that compares each region's beginning and ending temperature and soil measurements to that of the native site. Use "+" if

**EARTH SYSTEMS INVESTIGATION AREA - PHENOLOGY/SEASONS  
GLOBE SAMPLE STUDENT ASSESSMENT TOOL – HIGH SCHOOL**

- 7) **(Analyze & Compare GLOBE Data: Identify similarities and differences)** Using the table you just created, which of the three possible sites (Heath, Barron, and Kinninmont) looks like it has a growing season most similar to the native site?

In determining a possible site for growing non-native crops, what additional information would you need to make an accurate recommendation?

- 9) **(Communicate: Compose reports to explain or persuade)** Using the data analysis you have done, write a short report (about 1 page) that summarizes your findings and explains the pros and cons of each site (Heath, Barron, and Kinninmont) based on its similarity to the growing season of the native site. Make sure you discuss additional information that you would need to make a more accurate judgement on each of the sites. Also, be sure to support your conclusions with the data in the graphs and the analyses you have done while answering the questions.

- 8) **(Plan Investigations: Specify measurements to investigate)** Looking again at the marks you put on each graph that show where you think each season begins and ends, list two additional types of data in the GLOBE archives that would be helpful to determine the beginning and ending of each season.

Data 1:

Data 2: