

# FACTivity



## Time Needed

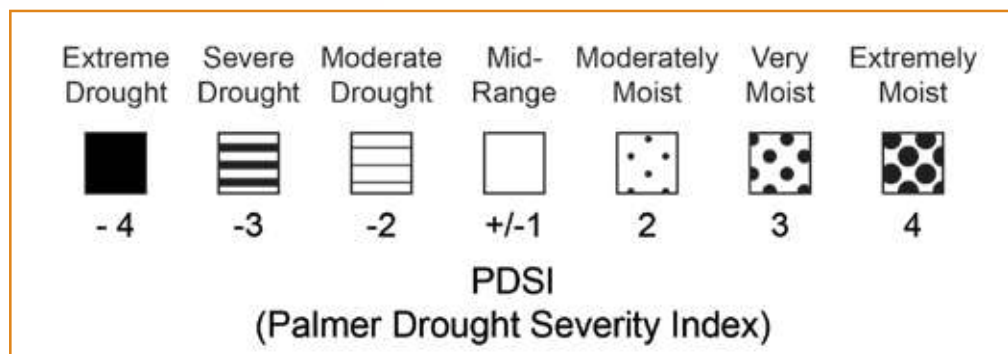
One class period

## Materials (for each student or group of students)

- Pencils
- Computers (optional)
- Internet (optional)

Results from “Where There’s Smoke, There’s Fire” showed that specific climate conditions were linked to very large wildland fires. The link was most clear when analyzing biophysical observations. These biophysical observations are representations of environmental conditions, such as seasonal drought or fire danger, and are calculated using weather data.

One of the biophysical observations was the Palmer Drought Severity Index (PDSI). PDSI is a math equation created in 1965 as a standard way to measure drought using soils (figure 12). The equation requires scientists to use weather data, such as air temperature data and precipitation data. They also must know characteristics of a location’s soil.

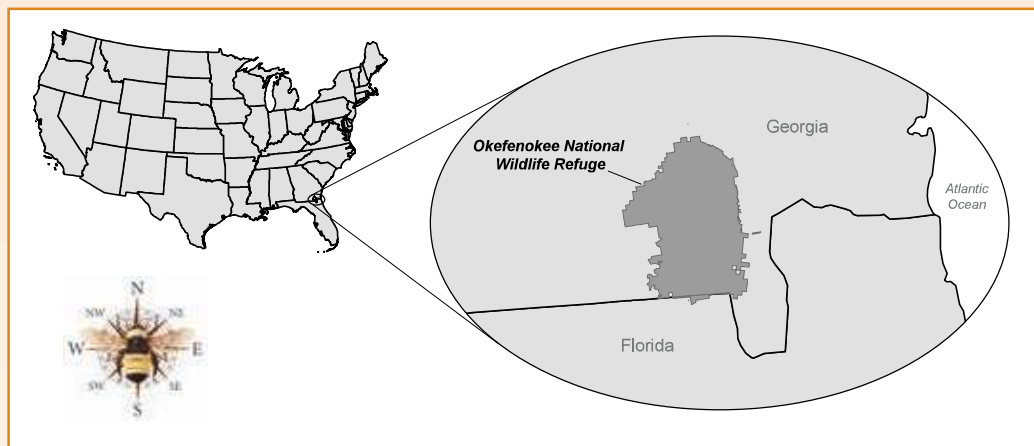


**Figure 12.** PDSI uses weather information and information about a location’s soils to help measure drought. When PDSI is calculated by scientists for a location, the value falls into one of seven categories, from “Extreme Drought” to “Extremely Moist.” Each category has a range of possible PDSI values, like “Severe Drought,” which ranges from -3.00 to -3.99. However, to simplify this activity, we use a single value for each of the categories. For example, “Severe Drought” will be indicated as -3.

Illustration by Stephanie Pfeiffer.

The scientists discovered some patterns between very large wildland fires and PDSI. However, the scientists focused only on the Western United States. Very large wildland fires can also occur in the Eastern United States. Okefenokee National Wildlife Refuge, for instance, has experienced very large wildland fires (figure 13). Very large wildland fires at Okefenokee National Wildlife Refuge have included the Blackjack Bay Fire, the Georgia Bay Complex Fire, and the Honey Prairie Fire (figure 14).

In this FACTivity, you will answer the question: Are there patterns that show a relationship between PDSI and very large wildland fires in the Okefenokee National Wildlife Refuge?



**Figure 13.** Okefenokee National Wildlife Refuge is located in south Georgia.

Map by Carey Burda.



**Figure 14.** The Honey Prairie Fire of 2011 (circled in the photo) burned over 300,000 acres in and around the Okefenokee National Wildlife Refuge. Four years earlier, the Georgia Bay Complex Fire in 2007 burned approximately 500,000 acres in the same area.

National Aeronautics and Space Administration photo.

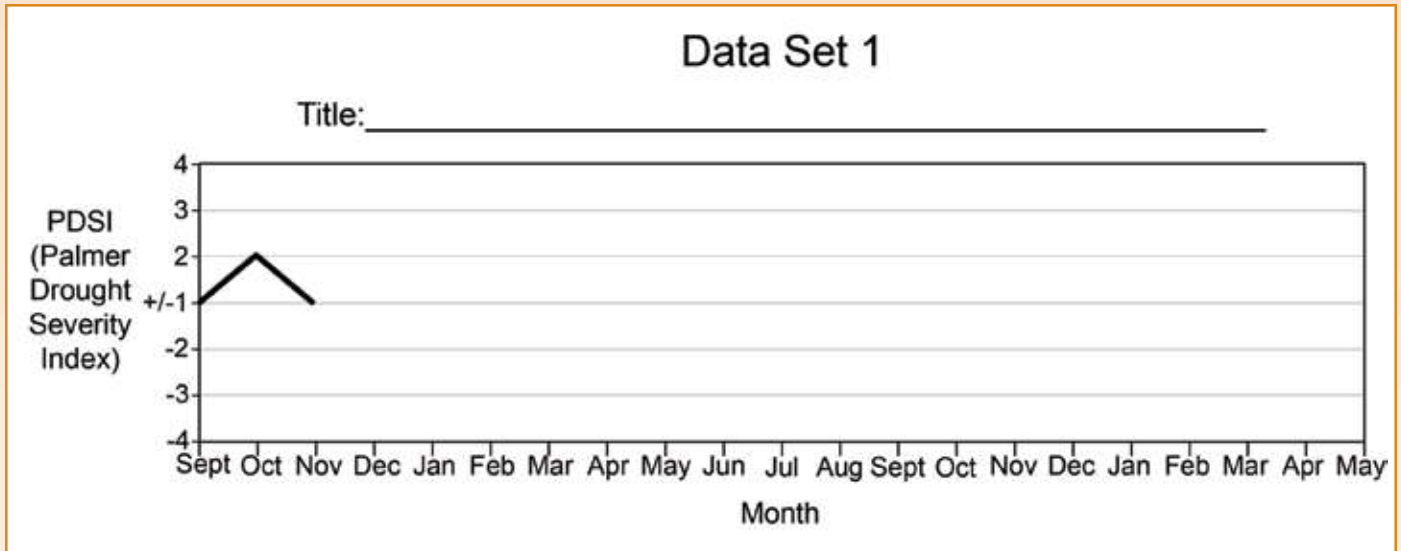
## Methods

Review the PDSI data in table 2. Each Data Set consists of 21 months of PDSI data. Use the PDSI scale in figure 12 to help you understand the data.

**Table 2.** Data Sets 1 and 2 represent periods during which a very large wildland fire occurred. Data Sets 3 and 4 represent periods during which no very large wildland fires occurred. Asterisks (\*) indicate the month in which a very large wildland fire began.

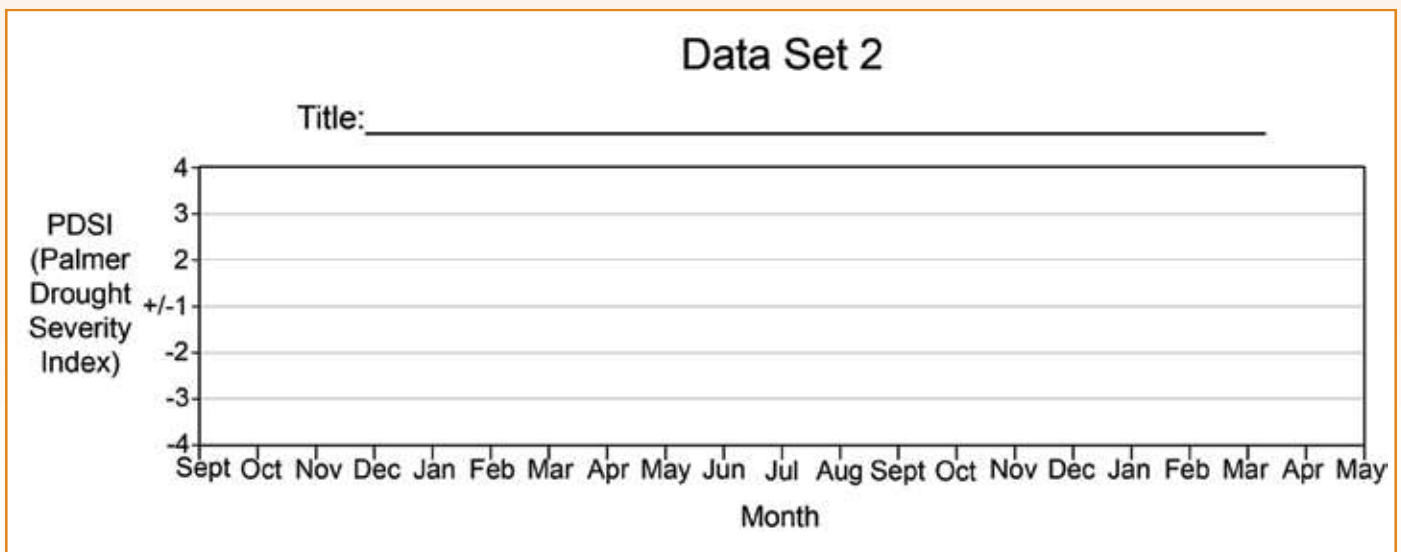
	Data Set 1 – Georgia Bay Complex Fire (2005-2007)	Data Set 2 – Honey Prairie Fire (2009-2011)	Data Set 3 – No very large wildland fire (2013-2015)	Data Set 4 – No very large wildland fire (2003-2005)
<b>MONTH</b>				
September	-/+1	-/+1	-/+1	-/+1
October	+2	-/+1	-/+1	-/+1
November	-/+1	-/+1	-/+1	-/+1
December	+2	-/+1	-/+1	-/+1
January	+2	-/+1	-/+1	-/+1
February	+2	-/+1	-/+1	-/+1
March	-/+1	-/+1	-/+1	-/+1
April	-/+1	-/+1	+2	-/+1
May	-/+1	-/+1	-/+1	-/+1
June	-2	-/+1	-/+1	-/+1
July	-3	-2	-/+1	-/+1
August	-3	-2	-/+1	-/+1
September	-3	-2	-/+1	+2
October	-3	-3	-/+1	-/+1
November	-3	-3	-/+1	-/+1
December	-3	-3	-/+1	-/+1
January	-3	-3	-/+1	-/+1
February	-3	-3	-/+1	-/+1
March	-3	-3	-/+1	-/+1
April	-4*	-3*	-/+1	-/+1
May	-4	-4	-/+1	-/+1

1. Beginning with Data Set 1, and using a first blank graph (figure 15), graph the data of Data Set 1. The first three data points have already been graphed. Use these three data points as an example of how to graph the remaining data.

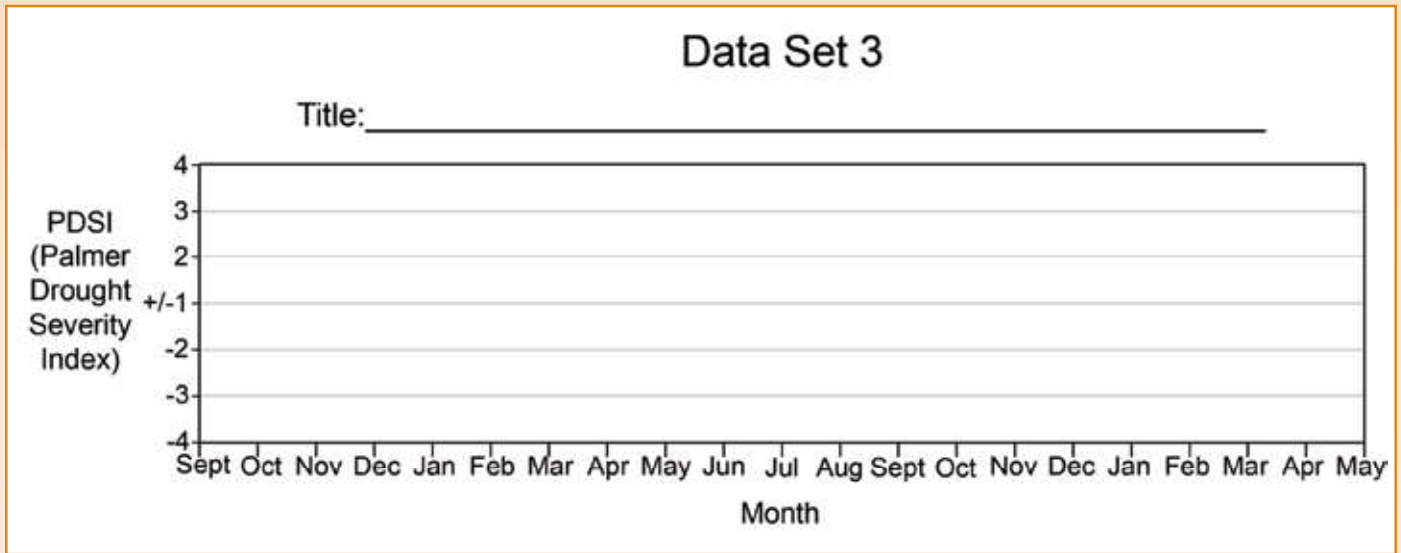


**Figure 15.** Blank graph for Data Set 1.

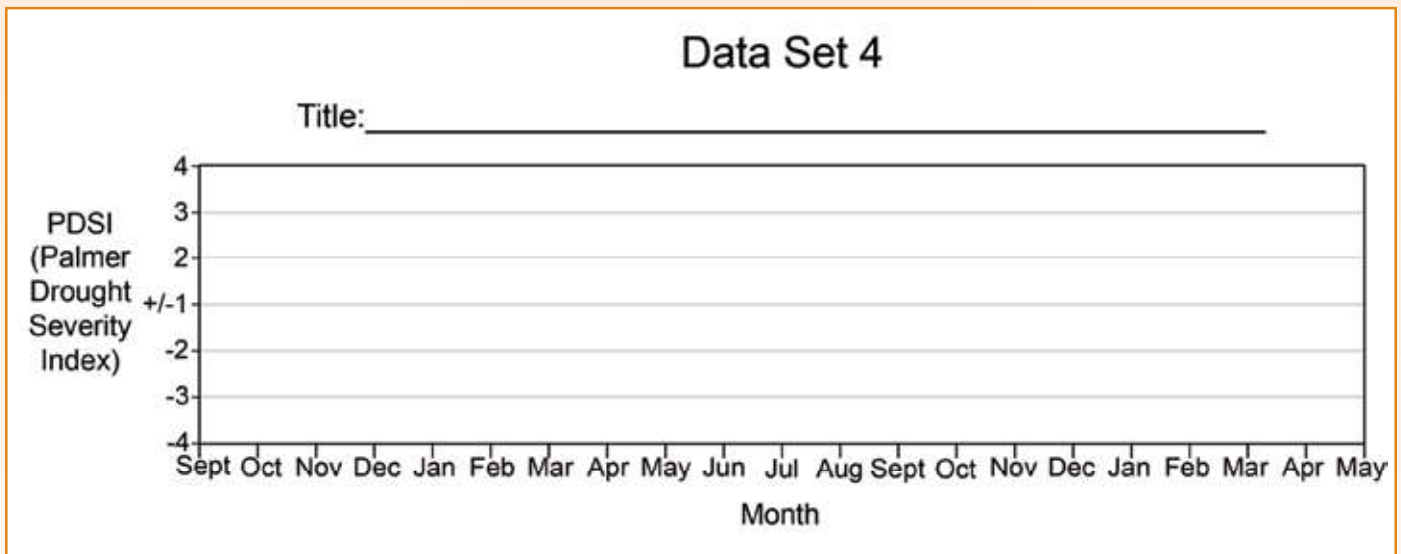
2. Use the blank line at the top of the graph to name the graph. Use information for the title that would help others understand the graph, like “PDSI Data From 2010–2011 in the Okefenokee National Wildlife Refuge.”
3. Now, use data from Data Sets 2, 3, and 4 to graph them on the second, third, and fourth blank graphs (figures 16–18).



**Figure 16.** Blank graph for Data Set 2.



**Figure 17.** Blank graph for Data Set 3.



**Figure 18.** Blank graph for Data Set 4.

4. Use the blank line to label each graph. Labels ensure that others will be able to understand what the graph is showing.
5. Compare the graphs of Data Set 1 and Data Set 2. Both graphs show the PDSI data from before, during, and after very large wildland fires. What similarities and differences do you see between these two data sets?

6. Now, compare the graphs of Data Set 3 and Data Set 4. No wildland fires were recorded during the periods that these data sets were collected. What similarities or differences do you see between the data sets? Do you think these patterns contributed to the lack of wildland fires? Why?
7. Lastly, compare the four data sets to one another. What similarities or differences do you see? Are there differences or similarities in PDSI between data sets that included wildland fires and data sets that did not include wildland fires?

Based on the graphs you have made, what conclusions can you make about PDSI and very large wildland fires in the Okefenokee National Wildlife Refuge? Why?

## FACTivity Extension

If you have access to a computer and the internet, visit the National Atmospheric and Oceanic Administration website for an activity using historical PDSI data. Start by visiting <https://www.ncdc.noaa.gov/temp-and-precip/>, then scroll and choose the “Historical Palmer Drought Indices” link.

As you learned, PDSI data tell us about the dryness of soils in a location. Once you are on the “Historical Palmer Drought Indices” page, use the date menus to select a beginning date of 6 months prior to the current date. Then, click the submit button. Watch the map as it illustrates the data on the map of the United States. Use the legend at the bottom to help interpret the data.

What do you observe occurring in the United States? What changes have occurred over the 6 months in the United States? What similarities or differences do you notice between the Eastern United States and the Western United States?

What do you observe occurring your location? Using what you learned in this article, discuss which factors you think led to these results.