

### The Impact of Climate Change on Prairie Potholes Activity 3 Landsat Activity

**Region:** Prairie Grasslands

**Grade Level(s):** Intended for middle school, but can be adapted to other grade levels

**Time Required:** Two 45-minute class periods (90 minutes)

#### What can students learn and do with Landsat Satellite Images?

Since 1972, satellites have been circling the Earth taking specialized photographs called Landsat images. These digital images of the Earth's surface allow people to analyze the impact of events on our landscape, whether they are man made or natural. Analysis of these images can be as informal as two people looking at several images side by side, or as formal as integrating the images into a Geographic Information Systems (GIS) computer model for in-depth scientific analysis. All of this information is revolutionizing the way we understand, manage, and protect our natural resources and plan for the future. For this reason, analyzing satellite images of the Earth from space is rapidly becoming an important and valuable skill in a multitude of workforce areas. According to the U.S. Department of Labor, jobs using geospatial technologies are among the fastest-growing in the country. About 20 NASA Earth-observing satellites now monitor changes in land, water, ice, air, and life at regional, continental, and global scales, providing a new and powerful perspective on our planet.

Students in Grades 6-10 can get an introduction to interpreting Landsat satellite images through the classroom activity, ***Quantifying Changes in the Land Over Time*** at this URL: [http://landsat.gsfc.nasa.gov/education/resources/Landsat\\_QuantifyChanges.pdf](http://landsat.gsfc.nasa.gov/education/resources/Landsat_QuantifyChanges.pdf). This activity uses Landsat images of Phoenix, AZ. Students learning about climate change in the Prairie Grasslands ecoregion should work with the Landsat images of North Dakota found below.

#### Preparation:

Teachers do not have to be experts in satellite imagery to conduct this activity with students, whether with images of Phoenix or of Prairie Grasslands. But before teaching the activity it is advisable for teachers to develop a basic level of understanding and familiarity by reviewing the Landsat activity mentioned above, ***Quantifying Changes in the Land Over Time***. In particular, be sure to review the following sections of the activity: "What you need to know about Landsat Satellites for this Activity," and, "About Color in Landsat Images."

To learn more about Landsat education resources, go to:  
<http://landsat.gsfc.nasa.gov/education>

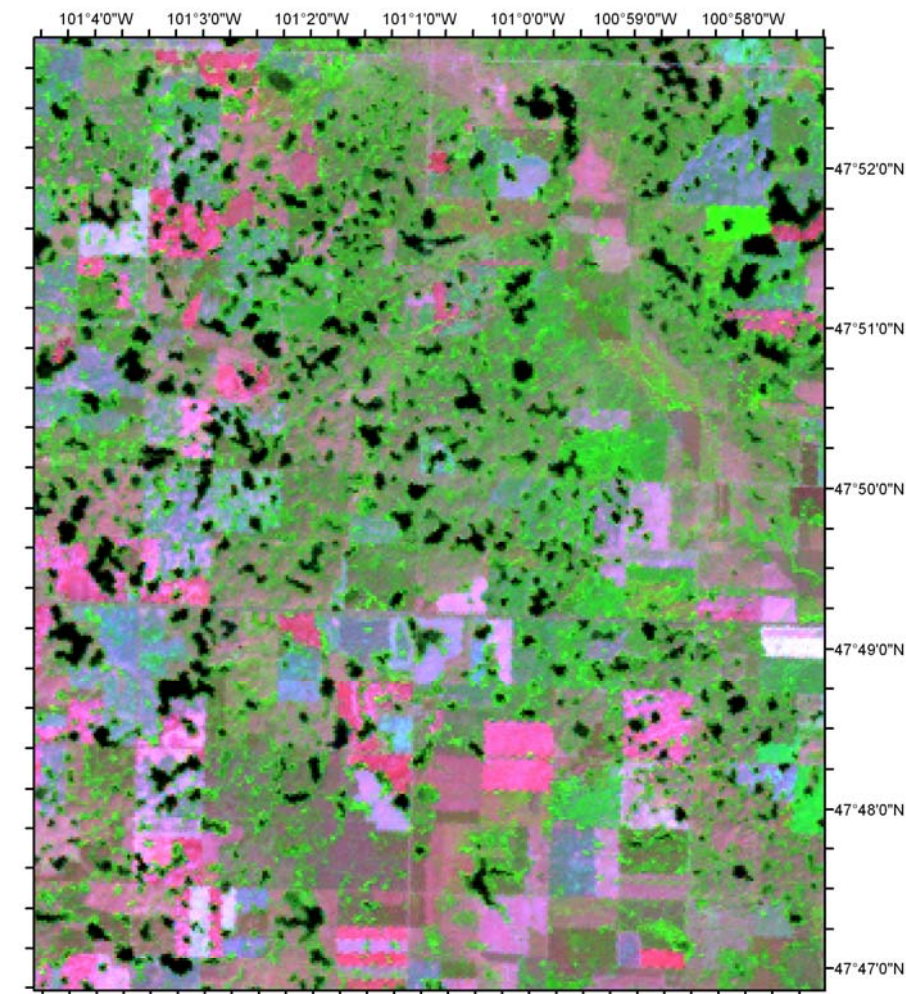
#### About the Prairie Grassland Satellite Image Pair:

This pair of images shows one area in North Dakota on two dates: August 1997 and August 2007, 10 years apart. Pinks and reds, greens and black indicate different types of land cover. Pinks and reds indicate bare soil; greens indicate vegetation, and black indicates water. The change that matters most for the purpose of this classroom activity is the change in the extent of areas covered by water. We are interested in knowing how much change there has been in the extent of potholes and other water sources for ducks and other waterfowl. Since black indicates water in these images, the color that matters most to us is black.

### **Procedures/Instructional Strategies:**

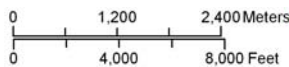
Using the classroom activity, ***Quantifying Changes in the Land Over Time***, students will be able to quantify how much of the land surface that was water in 1997 has been changed to land by 2007.

As a matter of information, rectangles in satellite images almost always indicate human-made features in the landscape, whether they are farming fields or city blocks. Roads may be curvy or straight. In the upper half of the 1997 image, a curving road is faintly visible. In the 2007 image, the road is more easily discerned.

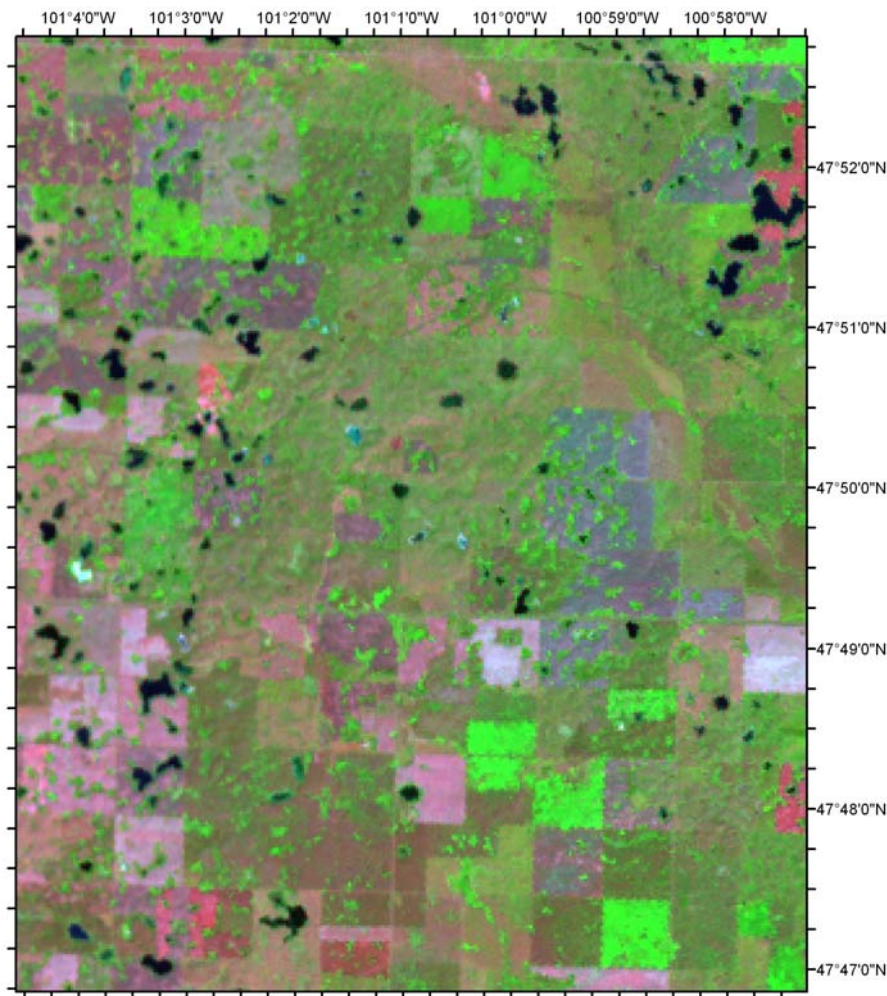


Landsat TM 5, 1997-Aug-22

Band combination:  
Band 7 - red,  
Band 4 - green,  
Band 3 - blue

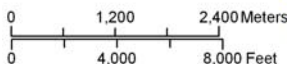


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Landsat TM 5, 2007-Aug-25

Band combination:  
Band 7 - red,  
Band 4 - green,  
Band 3 - blue



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