



Lesson 4: Wildfire Mapping Applications

Overview: Students will explore wildfire mapping applications and will examine how GIS is used in fighting wildfires. The tools can be applied to the investigation of a variety of topics and areas of the world. Students should be familiar with navigating ArcGIS Online and are encouraged to have an ESRI ArcGIS Online user account. Maps can then be saved in users “My Contents” folder and can be shared with others.

Objectives/Learning Target: Students will be able to:

- Navigate ArcGIS as a geospatial technology tool including zooming in/out, finding places, changing basemaps, and exploring layers
- Investigate causes of wildfires and potential impacts on homes
- Examine Firewise interactive tools to reduce the risk of wildfires
- Investigate various wildfire mapping applications
- Identify homes at risk of loss to wildfires
- Prepare a PowerPoint or Word document summarizing a student’s research

Grade: 8th and 9th

Time: 2 classes

Required Materials:

Teacher has access to Computer Internet access with projector

Student has access to Computer Internet access.

Handouts: “Saving an Image 2016” and “#1 Lesson 4 - Wildfire Mapping Applications Handout.pdf”

Presentation: “#2 Lesson 4 - Wildfire Applications.pdf”

Suggested Procedure:

Opening:

The teacher may begin by showing “2 Lesson 4 - Wildfire Applications.pdf” as an overview for this lesson. The teacher may also project the hand out “1 Lesson 4 - Wildfire Mapping Applications.pdf”.

Development:

The teacher will model the first day’s activities by demonstrating “2 Lesson 4 - Wildfire Mapping Applications.pdf”. The teacher may continue to model the lesson based on students’ level of technology and geospatial understanding. This lesson will require monitoring students’ progress due to their individual levels of understanding and skill. Students familiar with other geospatial technologies, such as Google Earth, will have greater success with this lesson and progress more quickly through the lesson.

The teacher will highlight “Wildfire Mapping Applications” and discuss with students the cost/benefit of building homes in wildfire prone areas and how the threat of wildfires are extending to areas not usually at risk of wildfires. Questions to be asked include: What are the causes of wildfires? How do wildfires spread? What mitigation efforts could reduce the loss of homes to wildfires?

Students work independently or with a partner to complete the handout, “1 Lesson 4 - Wildfire Mapping Applications.pdf”. Students begin by completing a chart to record Wildfire Danger in Minnesota and other regions of U.S.A.

Next, students may capture images of wildfire activity nationally or in their community. The teacher will determine whether students will create a map of their community or a map(s) of other regions of USA. In addition, the teacher will determine whether images will be saved and/or printed. Last, students will write a brief paragraph about wildfire dangers nationally and in their community.

Closure:

- Students present their results to the class by projecting the map image while explaining their research. They can use the ArcGIS data descriptions as a guide to their explanation
- Prepare a PowerPoint presentation or Word document.

Extension

Students may monitor news reports of wildfires and the go to current wildfire activity map and input the name in the find. They could save map images to produce a PowerPoint presentation or Word document using web links listed in Website Resources.

Assessment

Student Presentations or Word document

Minnesota Social Studies Standards:

(8th Grade)

Standard 1. People use geographic representations and geospatial technologies to acquire, process and report information within a spatial context.

8.3.1.1.1 Obtain and analyze geographic information from a variety of print and electronic sources to investigate places or answer specific geographic questions; provide rationale for its use.

8.3.1.1.2 Create and use various kinds of maps, including overlaying thematic maps, of places in the world; incorporate the “TODALSS” map basics, as well as points, lines and colored areas to display spatial information.

(9th Grade)

Standard 1. People use geographic representations and geospatial technologies to acquire, process and report information within a spatial context.

9.3.1.1.1 Create tables, graphs, charts, diagrams and various kinds of maps including symbol, dot and choropleth maps to depict the geographic implications of current world events or to solve geographic problems.

9.3.4.1.1 Analyze the benefits, costs, risks and tradeoffs associated with natural hazards, including the selection of land use and engineering mitigation.

Minnesota Science Standards:

8.3 Human activities can contribute to the frequency and intensity of some natural hazards. These hazards include floods, landslides, droughts, forest fires, and erosion.

9.3.4.1.1 Natural Hazards - Analyze the benefits, costs, risks and tradeoffs associated with natural hazards, including the selection of land use and engineering mitigation. For example: Conflict of housing developments in areas that are prone to wildfires (Wildland/Urban/Interface - WUI).

Website Resources

Minnesota Social Studies and Science Standards

- [2011 Minnesota K-12 Academic Standards in Social Studies](#)
- [Curriculum Guides and Resources](#)
- [8.3.4.1 Natural Resources | SciMathMN](#)
- [9.3.4.1 Benefits vs Risks | SciMathMN](#)



GIS 4 Schools www.gis4schools.org

Minnesota Wildfire Links

- [MN DNR Firewise](#)
- [MN DNR – Wildfire Causes](#)
- [Wildfire Information Center](#)

National Wildfire/Firewise links

- [2010 Wildland-Urban Interface in USA](#) – University of Wisconsin
- [2010 Housing Density in USA](#) – University of Wisconsin
- [Firewise Communities](#)
- [Firewise.org Interactive Modules](#)
- [National Park Service: Teacher Resources - Fires](#)
- [Wikipedia - List of California Wildfires](#)
- [Wikipedia - Wildfires](#)
- [Wildfire Education Links for Teachers](#)

GIS Mapping Links

- [Fighting Fires with GIS](#)
- **Disaster-Response Wildland Fires**
<http://www.esri.com/services/disaster-response/wildlandfire>
- **Public Information Map**
<http://www.esri.com/services/disaster-response/wildlandfire/latest-news-map>
- **2015 California Wildfires**
<http://esri.github.io/public-information-map-template-js/?webmap=9e6961b8e3724b1583ea594aeb2de8a6>
- **Wildfire Hazard Potential**
<http://www.arcgis.com/home/webmap/viewer.html?webmap=fcbf5d1de12e4556a2b8632e29dab941>
- **US Wildfire Activity Web Map**
<http://www.arcgis.com/home/webmap/viewer.html?webmap=df8bcc10430f48878b01c96e907a1fc3>
- **Federal Emergency Management Agency**
<http://www.arcgis.com/home/webmap/viewer.html?webmap=2a7ffddc6fd1437aa292b108a3b1ee6a>
- **Rim Fire at Yosemite**
<http://www.arcgis.com/home/webmap/viewer.html?webmap=0b93a68842f648a1a4f006346a4c931f>
- **California Burning**
- <http://www.californiaburning.org/capradio>
- **California Wildfires**
<http://www.capradio.org/rtaglist?tag=wildfires>
- **CalFire**
http://www.fire.ca.gov/fire_protection/fire_protection_fire_info_redbooks
- **Science News - Wildfires**
<https://www.sciencedaily.com/releases/2014/08/140806173838.htm>
- **Wildfire News**
https://www.sciencedaily.com/news/earth_climate/wildfires/
- **Wildfire: It's not Spreading like wildfire**
<https://www.sciencedaily.com/releases/2016/05/160524144921.htm>

Saving Images 2016

USA Demographics for Schools cannot print the image that is on your screen, so you need to capture it and paste it into a Microsoft Word document to save it and/or print it.

If you are using a Macintosh computer:

- a. Center your image and hold down the **Shift, Ctrl**, and the number **4** key simultaneously. Beginning in the upper left hand corner of the map window and including the entire map, drag a box around your map.
- b. Minimize your document in the Classroom window. Open a blank Microsoft Word document. Type your name(s) in the upper left hand corner of the document. Insert two blank lines and then paste your map image into your document by pulling down the Edit menu and selecting **Paste** or by clicking **Ctrl-V**.
- c. Save your file using the file name protocol and location indicated by your teacher and/or print the document as your teacher directs.

If you are using a PC computer:

- a. Center your image and hold down the **Alt** and **Prt Scr** keys simultaneously.
- b. Minimize your document in the Classroom window. Open a blank Microsoft Paint document. Make sure the scroll bars are pushed to the left and top of the window.
- c. Paste your map image into your document by pulling down the **Edit** menu and selecting paste or by clicking **Ctrl-V**.
- d. Click and drag the lower right hand corner of the white background box to trim the image if necessary.
- e. Select **File, Save As** and type your file name using the file name protocol indicated by your teacher into the File box. Change "Save as type" to **JPEG**. Select the location indicated by your teacher in the **Save In** box. Click **Save**.
- f. Open a blank Microsoft Word document. In the upper left hand corner of the document, type your name(s) and name the city you are mapping. Insert two blank lines, then pull down the Insert menu and select **Picture, From file**. Navigate to the location where you saved your JPEG, select it and click **Insert**. Resize the image to fit the page. Under the image describe what the image shows. Select **File, Save As** and type your file name using the file name protocol indicated by your teacher into the file box.
- g. Save your file using the file name protocol and location indicated by your teacher and/or print the document as your teacher directs.