Lesson 1: Asking Geographic Questions About Wildfire

LESSON OVERVIEW

In this lesson students define wildfire and use diagrams and maps to predict, identify and explain Minnesota wildfire locations.

OBJECTIVES
The student will be able to:

1. Define wildfire.
2. Predict, identify and explain Minnesota wildfire locations.
3. Interpret a Minnesota wildfire map on the Internet.
4. Consider causes and effects of wildfires.

ESTIMATED TIME

Two 50-minute class periods.

MATERIALS NEEDED

Teacher

Computer and LCD Projector
Internet connection
Images 1 - 5: Firewise Definition of Wildfire, Minnesota Map, Fire Triangle, Fire Behavior Triangle and Minnesota Biome Map and What is Wildfire 2011? PowerPoint presentation (2011Teacher DVD)

Student

Firewise in the Classroom Community Assessment Process Student Guide - Sections 1-7

VOCABULARY: wildfire, Fire Triangle, Fire Behavior Triangle, topography, biomes

ACTIVITY

1. Begin Lesson 1 by asking students to silently create their own mental picture of wildfire. What does it look like? What does it sound like? What does it smell like? After a few moments, discuss their mental pictures.

2. Now, ask students to define wildfire. After students have suggested several definitions, project Image 1, Firewise Definition of Wildfire. Compare and contrast student definitions with the Firewise definition.

3. Pass out the Firewise in the Classroom Community Assessment Process Student Guide. Read and discuss the Student Learning Goals, and provide students with a preview of the Firewise project.

4. Have students turn to Section 1, What Is Wildfire, and record definitions of wildfire from the opening discussion.

5. Direct student's attention to Section 2 of the Student Guide, Minnesota Wildfire Locations. On Map 1, ask students to predict the areas of Minnesota that experience the most wildfires, and to indicate those areas on the map by circling, shading or symbolizing.

6. When students have finished, ask them to "pair and share", turning to a classmate close to them to compare and contrast their maps. While students are exchanging ideas, project Image 2, Minnesota Map. After students have had a few minutes to discuss their maps with each other, ask student volunteers to share their predictions with the class. Discuss.

7. Explain that the class will now look at two diagrams that may assist them in making a more accurate prediction of wildfire prone areas in Minnesota.

Lesson 1: Asking Geographic Questions About Wildfire (continued)

8. Direct student's attention to Section 3 of the Student Guide, The Science of Wildfire.

9. Project Image 3, Fire Triangle. Have students sketch and label the sides of the Fire Triangle in their Student Guide. Discuss each side of the triangle.

    - What is a fire's source of oxygen?
    - What are a fire's potential sources of heat?
    - What are a fire's potential sources of fuel?

    Have students list these potential sources in their Student Guide.

10. Project Image 4, Fire Behavior Triangle. Have students sketch and label the sides of the Fire Behavior Triangle in their Student Guide. Discuss each side of the triangle.

    - What is topography, and how can it affect the occurrence and spread of wildfire?
    - How can weather affect the occurrence and spread of wildfire?
    - Which types of fuels feed a wildfire?

11. Project Image 5, Minnesota Biome Map. Discuss what a biome is and which biomes are most prone to wildfire. Direct student's attention to Section 4 of the Student Guide, Minnesota Biomes. Discuss the three major Minnesota biomes. Ask students to indicate on the Minnesota Biome Map which biomes are most prone to wildfire by circling, shading or symbolizing.

12. Redirect student's attention to Section 2 of the Student Guide and their Wildfire Location Predictions map. Which areas of Minnesota did they predict would experience the most wildfires? Does the new information about the Fire Triangle, the Fire Behavior Triangle and Minnesota biomes change their predictions? If so, how? Discuss. Inform students that they will now have an opportunity to check their predictions.

13. Navigate to the Minnesota DNR Wildfire Information Center web page at http://www.dnr.state.mn.us/forestry/fire/index.html.

14. Examine this page briefly and then click on the link to the Fire location map. You will see a map of Current Fire Locations. Under Select Map, click on the radio button for "Year-to-Date" to view all fires reported for the current calendar year. Note the date, summary figures and legend to the right and map tools to the left.

15. Compare and contrast the current fire information with student predictions. Discuss the idea that this data is for the year-to-date, that it may be early or late in the fire season, that this year may be a typical or atypical year for Minnesota wildfire, and that this map shows only fires for which the Minnesota DNR was the primary responding agency. Inform students that this web page is an Internet Map Server powered by computer software called a Geographic Information System (GIS).

16. Redirect student's attention to Section 5 of the Student Guide, Checking Your Prediction. On Map 2, Minnesota Wildfire Locations, ask students to indicate the areas of Minnesota that have experienced the most wildfires this year, based on what they have learned from the Minnesota DNR Wildfire Information Center website.

17. Ask students to brainstorm potential causes of wildfires. How are these causes similar to or different from the causes of other types of fires? Return to http://www.dnr.state.mn.us/forestry/fire/maps/locations.html and click on the link to Fires by Cause, 1987-2006 under Historical Charts. Discuss the causes illustrated by the pie graph.

18. In conclusion, direct student's attention to Section 6 of the Student Guide, Asking Geographic Questions about Minnesota Wildfire. Discuss the three basic questions of the geographer: Where is it? Why is it there? What difference does it make? Ask students to answer the three basic questions based on the day's activity.

19. Assign students to add depth to their responses by researching recent wildfires in Minnesota and/or the U.S. Where are wildfires occurring? Why are they occurring in those locations? What physical and human effects are associated with these wildfires? Research can be recorded in Section 7 of the Student Guide, Recent Wildfire Research.

CONCLUSION

Answer any questions related to the day's topics.

ASSESSMENT

Formal - Firewise Student Guide - Sections 1 - 7

EXTENSION

1. Display the Biomes of Minnesota poster and/or other thematic Minnesota maps. Discuss how map data about such things as topography, weather, fuels and population can help us predict wildfire locations.

2. Students can further explore high and low wildfire risk areas in the United States and share their findings. See Teacher Resource Links.

Lesson 2: What is Firewise?

LESSON OVERVIEW

In this lesson, students are introduced to Firewise terminology and assessment techniques, home fire risk factors, and steps communities can take to reduce risk through a PowerPoint presentation and outlining activity.

OBJECTIVES
The student will be able to:

1. Outline a PowerPoint presentation.
2. Define Firewise terminology.
3. Identify home fire risk factors.
4. Understand assessment techniques used to determine Firewise property.
5. Identify steps communities can take to promote Firewise goals.

ESTIMATED TIME

One 50-minute class period.

MATERIALS NEEDED

Teacher

Computer and LCD Projector, Internet connection,
Firewise MN Bound video and What is Firewise 2011? PowerPoint presentation
(2011 Teacher DVD)

Student

Firewise Student Guide - Section 8

VOCABULARY: Firewise, Wildland/Urban Interface, home ignition zone, defensible space, access, site, ladder fuels, flying embers, structure, burning practices, defensible space, Level 1 Firewise Community Assessment, Firewise, Density Surface Model (DSM), Level 2 Firewise Community Assessments, Firewise Community Plan

ACTIVITY

1. Begin Lesson 2 by reviewing the previous day's learning. Answer any student questions related to the content.

2. Direct student's attention to Section 8 of the Student Guide, What is Firewise? PowerPoint Outline. Prepare to show the PowerPoint presentation.

3. Inform students that they will be utilizing this information in future classes to conduct a Firewise Community Assessment and to prepare a Community Report.

4. Direct students to complete the outline as they watch and discuss. Show the What is Firewise? PowerPoint.

5. After the presentation is completed, allow students a few minutes to finish the outline. Discuss student responses.

CONCLUSION

Answer any questions related to the day's topics.

ASSESSMENT

Formal - Firewise Student Guide 1 - Section 8

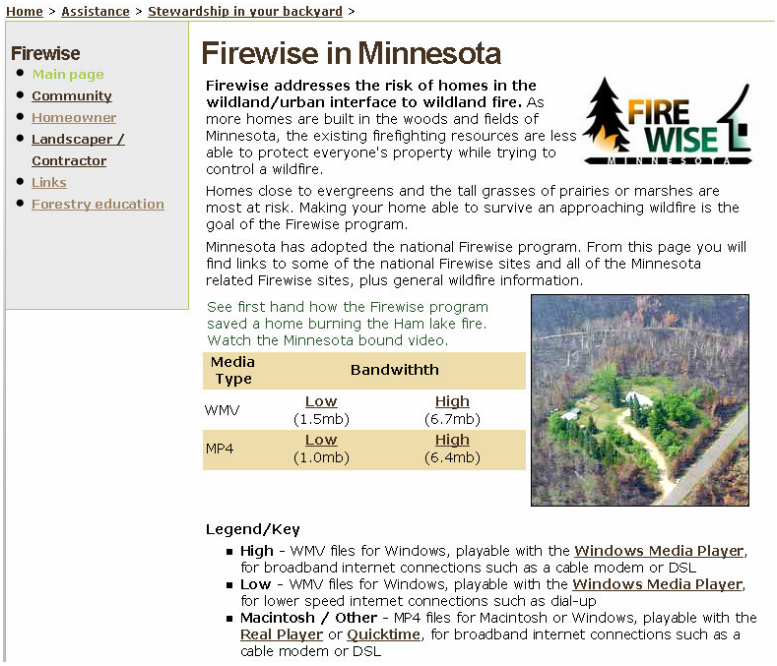
Lesson 2: What is Firewise? (continued)

EXTENSION

Students can explore the Firewise Communities and Firewise Minnesota websites and share their findings. Type in the links below or see Teacher Resource Links.

Minnesota Department of Natural Resources

http://www.dnr.state.mn.us/firewise/index.html



http://www.dnr.state.mn.us/education/wildfire/firewise_communityproject.html

Lesson 3: Making Sense of the Public Land Survey System

LESSON OVERVIEW

In this lesson students are introduced to the Public Land Survey System (PLSS) and how it is used to identify and locate land parcels.

TEACHER NOTES

BEFORE BEGINNING THE ACTIVITY

1. One class period option: You can complete the lesson as an Internet activity, view YouTube videos and print copies of the Public Land Survey Background reading for student use. See Teacher Resource Links

2. Second class period: Use Firewise in the Classroom Internet Map Server to demonstrate the Public Land Survey in Minnesota. Fill out the Firewise in the Classroom Authorization Form (Introduction section) and contact your Firewise Community Specialist to verify that you are a registered Power user of Firewise in the Classroom.

OBJECTIVES
The student will be able to:

1. Define the Public Land Survey System (PLSS).
2. Explain why the Public Land Survey System (PLSS) was created.
3. Explain how the Public Land Survey System (PLSS) is used to identify and locate land parcels.

ESTIMATED TIME

One to two 50-minute class periods.

MATERIALS NEEDED

Teacher

Computer and LCD projector
Images 6 and 7 - U.S. Public Land Survey System (2011 Teacher DVD)
Internet connection and YouTube videos (2011 Teacher DVD)

Student

Computers (one per student or pair of students)
Internet connection
Firewise Student Guide - Section 9

VOCABULARY: PLSS, township, range, section

ACTIVITY

1. Begin the activity by posing this question to students:

   If an immigrant farmer from Europe arrived in New York in 1850 and wanted to buy land in Minnesota from the Minnesota Land Office, what would he need to know in order to purchase and locate a specific piece of land?

2. Explain to students that the farmer would need to know the exact parcel of land that he was purchasing, so he could accurately locate it and settle it. This process was made possible by the Public Land Survey System (PLSS), which is still in use today. The Public Land Survey System (PLSS) was proposed by Thomas Jefferson and began after the Revolutionary War as a method for dividing and describing federal government land in the United States. The government wanted to distribute land to soldiers as a reward for their service, and to sell land to make money. In order to do this, the land needed to be surveyed and assigned a legal description consisting of a township, range and section number. The Land Ordinance of 1785 and the Northwest Ordinance of 1787 established surveying guidelines.

Lesson 3: Making Sense of the Public Land Survey System (continued)

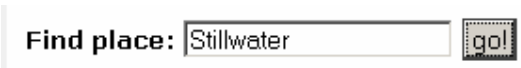
3. Show the YouTube video: PLSS – Surveying the Land (refer to the Teacher links, Lesson 3 for the link and videos on 2011 Teacher DVD).

4. Project Images 6 and 7 - U.S. Public Land Survey System. Note that the system is not in use in most of the original 13 colonies, Texas or Hawaii. Discuss the idea that the Public Land Survey System (PLSS) is similar to a grid overlaid on the land. A standard Township contains a 6 mile by 6 mile grid of 1 square mile Sections. Sections are numbered beginning in the northeast corner of the Township and snake back and forth across the Township from north to south following the tracks of the early surveyors as they moved across the landscape. Townships that are bounded by international or state borders, on the Iron Range or at a "seam" in the PLSS may have irregular shapes and sizes.

5. Explain to students that you are going to introduce them to some of the basic functions of the Firewise in the Classroom Community Assessment Process Internet Map Server and use it to show them the grid pattern on the land of Minnesota by projecting aerial photography with PLSS Township and Section lines overlaid.

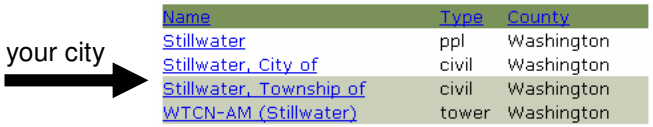
6. Second class period lesson: Use Firewise in the Classroom to show the public land survey. Navigate to the Firewise site at: http://webapps1.dnr.state.mn.us/firewise-classroom and log in as a Power User. Firewise in the Classroom will open with a map of Minnesota Counties.

7. Use the Search feature to go to your project area. Firewise in the Classroom opens this feature automatically. Type your City name into the Find place box in the middle of the window below the Map Legend. (Stillwater Township will be used as an example). Click go!



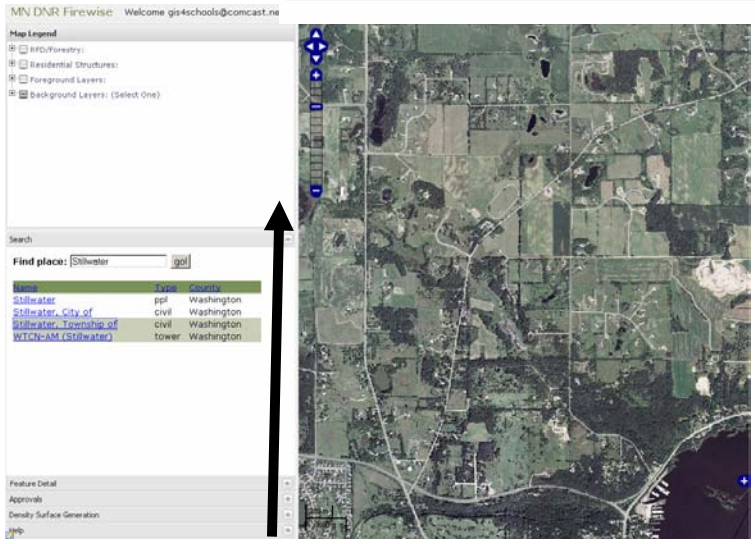
8. A Places List Page window will open. Click on your City/Township name**.**

9. Firewise in the Classroom will zoom in on your city and display an air photo.



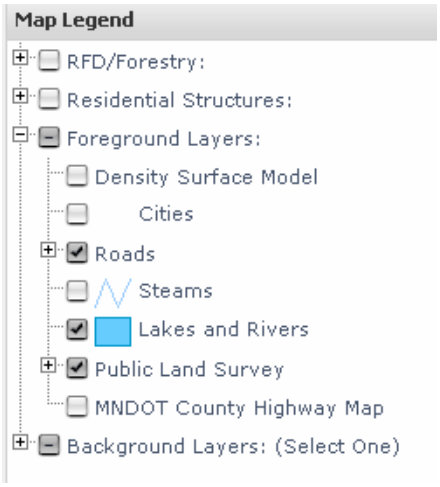
Name	Type	County
Stillwater	ppl	Washington
Stillwater, City of	civil	Washington
Stillwater, Township of	civil	Washington
WTCN-AM (Stillwater)	tower	Washington

Example

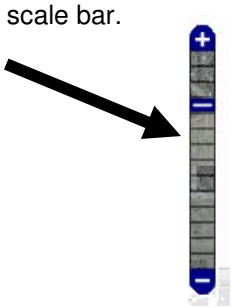


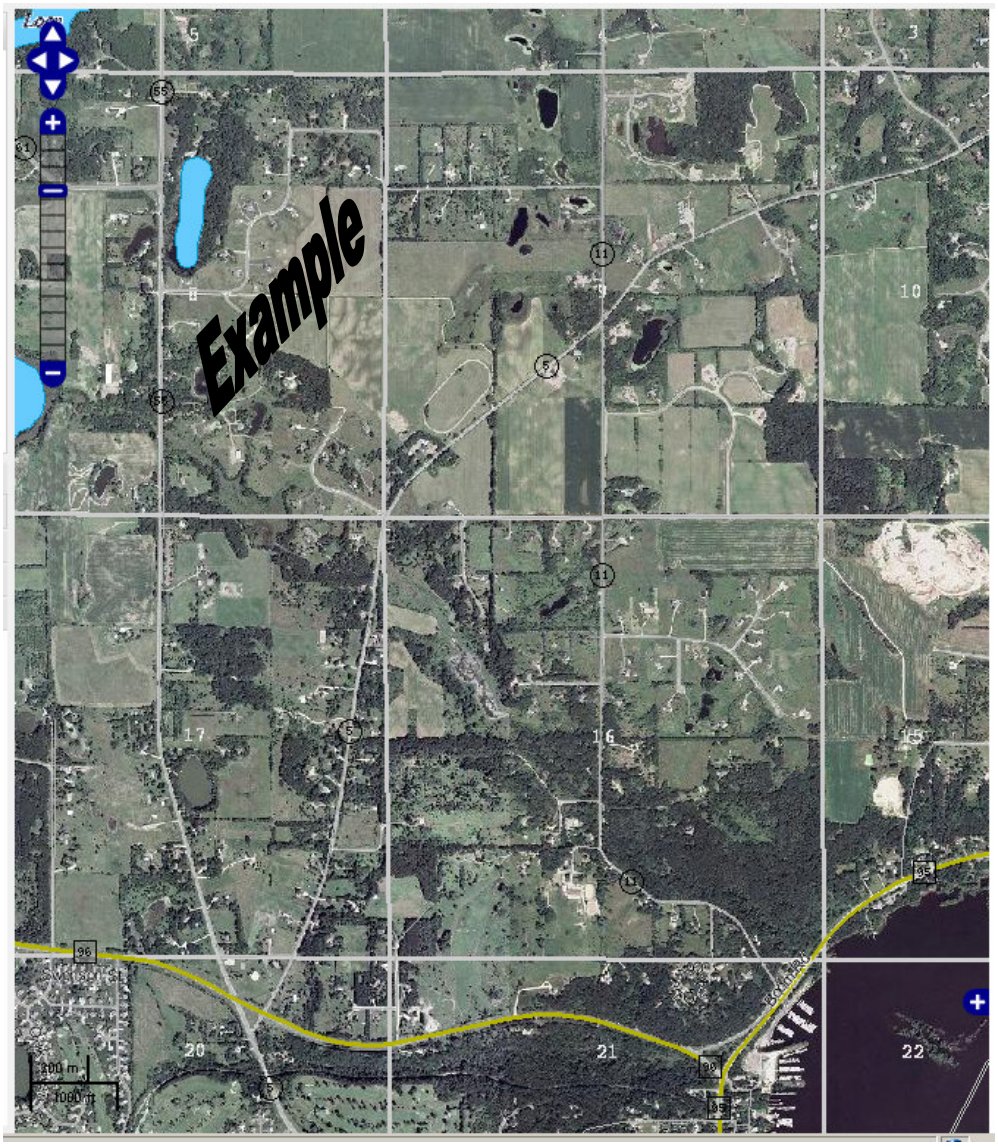
10. Close the Search feature by clicking on the ━ symbol to the upper right above the Find Place entry bar.

11. Adding Overlays: Click on the **+** sign in front of Foreground Layers. Check the box in front of Roads. The Roads will draw automatically. Click the box if front of Lakes and Rivers and Public Land Survey to see all the overlays.

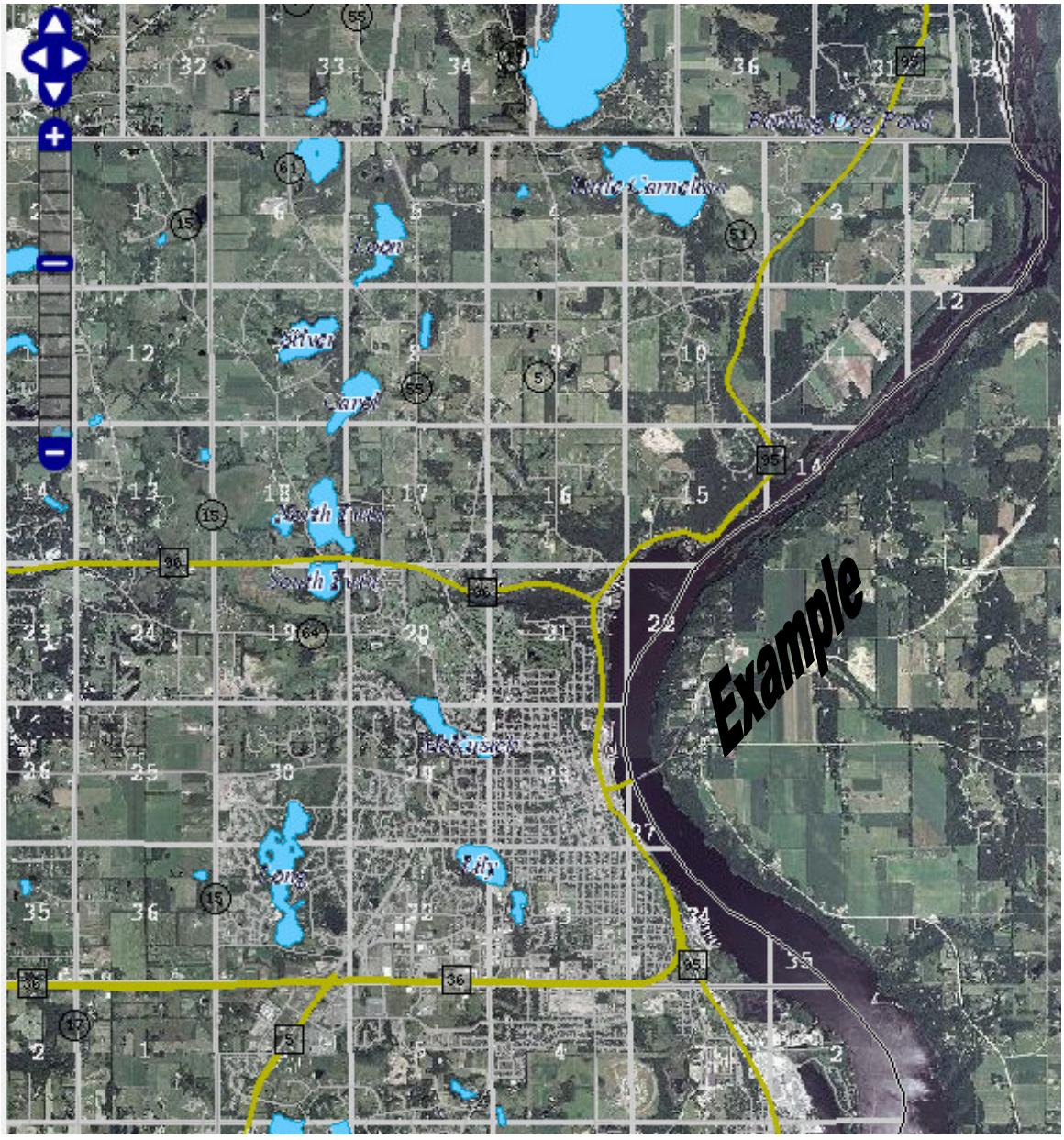


10. Navigating the map. The large white squares are sections. Section numbers are located in the center of each section. To see an entire Township click two boxes below the blue line on the scale bar. This will zoom out.





Discuss the grid pattern overlaid on the aerial photo. These are **Public Land Survey System (PLSS)** lines. The **Township** lines appear as gray lines in the center of the section lines. They are very thin and you need to look at the section numbers to determine the boundaries of a Township. Refer to Image 7 for the standard numbering system of a township. Explain to students that in the Firewise in the Classroom Community Assessment project, they will be assessing homes within specific **PLSS** Townships and Sections. There are incomplete sections on the right because of the Minnesota/Wisconsin border. Incomplete townships occur on all along the borders of Minnesota. Are there other instances of incomplete townships in Minnesota? Have the students look at the map showing the two major surveys that occurred in Minnesota.



11. Close JMAPS by clicking on the Log Out button in the upper right corner above the map.

Lesson 3: Making Sense of the Public Land Survey System (continued)

12. Explain to students that they will now learn more about the PLSS through a Guided Reading.

13. Direct students to Section 9 of the Firewise Student Guide - Making Sense of the Public Land Survey System Guided Reading Questions. Preview the questions. Have students complete the activity. Circulate to provide assistance.

14. When students have finished, debrief the activity.

CONCLUSION

Answer any questions related to the day's topics.

ASSESSMENT

Formal - Firewise Student Guide - Section 9

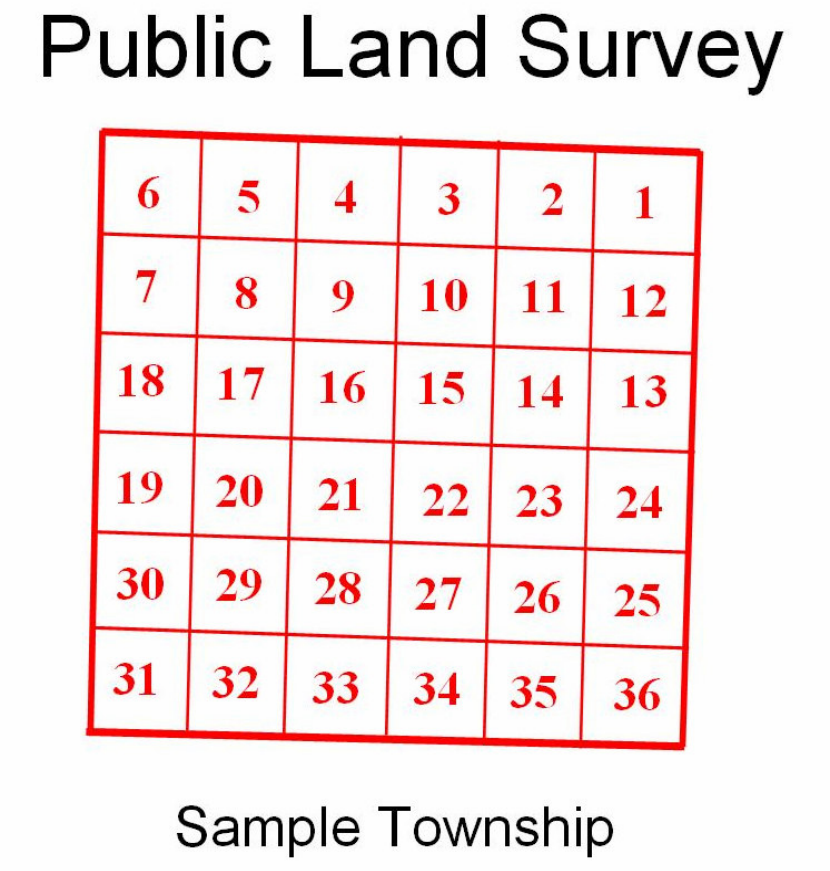
EXTENSION

1. Students can explore the National Atlas Map Maker Public Land Survey layers and share their findings. See Teacher Resource Links.

2. Students can research alternatives to the Public Land Survey System including the British Metes and Bounds system used in the original 13 colonies, the Kingdom of Hawaii native system and the Texas system based on Spanish land grants. See Teacher Resource Links.

3. Students can ask their parents or guardians to see a legal description of a family property and determine its PLSS location.

4. Students will use the sample township to find their assigned section.



Lesson 4: Level 1 - Firewise in the Classroom Community Assessment Process

LESSON OVERVIEW

In this lesson students are introduced to the Firewise in the Classroom Community Assessment Internet Map Server and utilize it to assign fire risk ratings to residential structures on aerial photos.

TEACHER NOTES

BEFORE BEGINNING THE ACTIVITY

1. Complete the Firewise in the Classroom Authorization Request Form (Introduction section) and contact your Firewise Community Specialist to verify that you are a registered Power user of Firewise JavaMaps. Your Firewise Community Specialist will provide you with student logins and passwords.

2. Prepare a list of Student Numbers, PLSS Section Numbers and Firewise in the Classroom student # logins and passwords for students.

3. Test the Firewise in the Classroom login procedure on teacher and student computers.

4. Use Firewise in the Classroom Internet Map Server to explore the aerial photo of your Township. Take note of PLSS Sections with no residential structures - you will not want to assign those to students.

5. Establish or verify procedures for students or student pairs to save unique files on the school server, student computers, or a storage device. Decide on a file name protocol that will help you keep student work organized. For example, last names_section#.

6. Depending on computer availability, students can work individually or in pairs.

DURING THE ACTIVITY

As students are working, capture digital photos and "screen shot" images for use in the Community Report.

AFTER THE ACTIVITY

1. Approve student features. (See "Approving Features" in Appendix.)
2. Create a Density Surface Model map to share and analyze with the class. (See Creating a Density Surface Model Map in Appendix.)
3. Contact your Firewise Community Specialist to let them know that the project is complete.

OBJECTIVES
The student will be able to:

1. Become familiar with the basic terminology and functions of the Firewise in the Classroom Internet Map Server.
2. Assign fire risk ratings to residential structures.
3. Analyze a Density Surface Model map.
4. Identify areas of potential wildfire risk in a community.

ESTIMATED TIME

Three to four 50-minute class periods

Lesson 4: Level 1 - Firewise in the Classroom Community Assessment Process (continued)

MATERIALS NEEDED

Teacher

Computer and LCD projector
Internet connection
Images 6, 7 and 8 (2011 Teacher DVD)
Digital camera (optional)

Student

Computers (one per student or pair of students)
Internet connection
Storage capability on school server, student computer or storage device
Firewise Student Guide - Section 10

VOCABULARY: Level 1 Firewise in the Classroom Community Assessment Process, PLSS (Public Land Survey System), township, section, Density Surface Model

ACTIVITY

1. Begin the lesson by reviewing the Public Land Survey System activity. You may want to project Images 6 and 7 as review tools.

2. Inform students that today they will begin their Level 1 Firewise in the Classroom Community Assessment Process by rating residential structures on aerial photos using the Firewise in the Classroom Internet Map Server. Each student or pair of students will be responsible for rating a PLSS section (or sections) and for capturing an image of their ratings to be submitted.

3. Project Image 8. Review the Firewise Home Rating Classification System. This system is also found in the Student Guide.

4. Direct student's attention to Section 10 of the Student Guide. Provide students with information needed to complete the top portion of the page.

5. Have students begin the Level 1 - Firewise in the Classroom Community Assessment Process and circulate to provide assistance. Provide students with a file name protocol for their Home Ratings Image files.

6. Do not rate more than one structure on a farmstead/homestead.

7. When the students have finished rating homes, make sure that they have captured a "screen shot" image of their sections that shows the number of homes they have rated. Several images can be saved showing that the students have done a good job at rating the homes.

8. When students have completed the activity, or the class period is over, remind them to Log out of Firewise in the Classroom Internet Map Server.

9. Debrief. Discuss student experiences with Level 1 - Firewise in the Classroom Community Assessment Process, the Home Ratings Image created, and potential wildfire risk areas.

10. Approve student features and create Density Surface Model map. Project and analyze map with the class. Identify potential wildfire risk areas. Inform students that all data generated will be provided to the Minnesota DNR Firewise Program and local fire department.

Lesson 4: Level 1 - Firewise in the Classroom Community Assessment Process (continued)

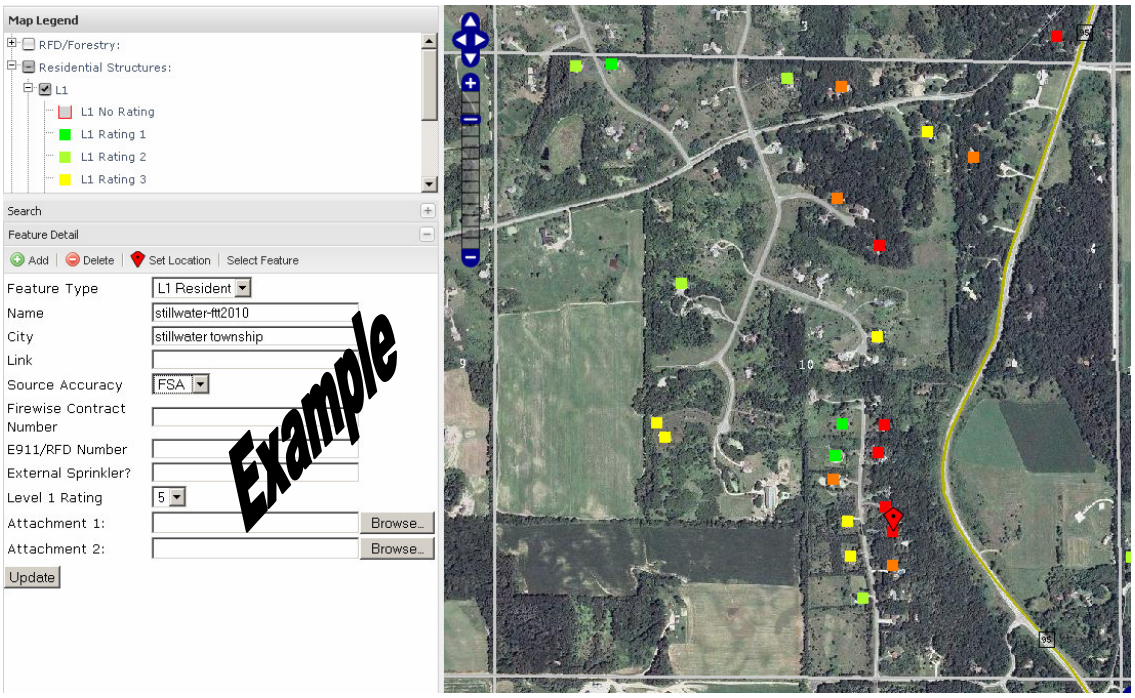
CONCLUSION

Answer any questions related to the day's topics.

ASSESSMENT

Informal - Potential wildfire risk area identification

Formal - Home Ratings Image (sample image below)



1 - No Risk: Structure is "in the clear". No trees or very few trees anywhere near the structure.

2 - Low Risk. Structure has trees around it, but they are at least 30 feet away. Note: 30 feet is the WIDTH of a typical house.

3 - Moderate Risk: Structure has trees within 30 feet.

4 - High Risk: Structure has trees within 30 feet, and trees are so close to the structure that your view of the structure is obscured on at least one side by the tree canopy.

5 - Extreme Risk: Structure has trees within 30 feet and trees are so close to the structure that your view of the structure is obscured on the south or west sides or multiple sides by the tree canopy. (Home is "buried in the trees".)

EXTENSION

1. Students can further explore the Firewise in the Classroom Community Assessment Process to become more comfortable with terminology and functions.

2. Students can further explore Fire Maps and Imagery and share their findings. See Teacher Resource Links for websites.

Lesson 5: Creating and Presenting a Firewise Community Report

LESSON OVERVIEW

In this lesson, students create and present a report to communicate their Firewise objectives, procedures, and recommendations to the community and Minnesota DNR Firewise Program.

TEACHER NOTES

BEFORE BEGINNING THE ACTIVITY

1. Determine whether the Community Reports will be an individual, partner, small group or whole class activity and how you will decide which report(s) are presented, shared or published.

2. Determine how much class time you will dedicate to working on the Community Reports, and how much time you would like students to spend outside of class.

3. Determine the Community Report format, or have students determine the format. Possibilities include a PowerPoint presentation (or similar presentation software), video, program for a local cable channel, news article, press release, brochure, booklet, newsletter, web page, open house, public meeting, or display.

4. If appropriate to the format, determine the community group that students will be presenting to (neighborhood group, Town Board, City Council, etc.) Assist students in contacting the community group and securing a place on the meeting agenda.

5. Determine assessment details for the Community Report.

DURING THE ACTIVITY

1. Provide opportunities for students to practice their Community Reports, receive constructive criticism, and make modifications. Time presentations to make sure they fit within the allotted time frame. Encourage students to think ahead and be prepared for technical difficulties or other unexpected events. Discuss appropriate dress and etiquette.

2. Assist students in assembling necessary supplies and materials for presentation of the Community Report such as a screen, laptop computer, projector, surge protector, extension cords, TV and VCR, meeting space, display space, handouts, sample Firewise materials, etc.

3. Invite the local media to attend a presentation of the Community Report.

4. Assist students with logistical details such as transportation.

5. Accompany students to the presentation. Allow time for set-up. Take digital photos for use in future Firewise presentations.

OBJECTIVES
The student will be able to:

1. Summarize Firewise Community Assessment objectives, procedures and recommendations.
2. Synthesize text, images and data.
3. Create and present a Community Report.

Lesson 5: Creating and Presenting A Community Report (continued)

ESTIMATED TIME

2 to 3 50-minute class periods plus homework time.

MATERIALS NEEDED

Teacher (will vary depending on format of the Community Report)
- Community Report Template PowerPoint Presentation (2011 Teacher DVD)
- Storage device for saving presentations (CD-ROM, DVD or flash drive)
- Maps, photos and images saved as. bmp, .gif or .jpg files
- Computer and LCD Projector
- Videotape footage
- TV and VCR
- Display boards
- Art supplies
- Digital camera

Student (will vary depending on format of the Community Report)
- Firewise in the Classroom Community Assessment Process Student Guide
- Firewise maps, photos and images saved as. bmp, .gif or .jpg files
- Computers with appropriate presentation, web authoring or graphic design software
- Access to color printer

For Presentations (will vary depending on format of the Community Report)
- Screen
- Laptop computer
- LCD Projector
- Surge protector
- Extension cords
- TV
- VCR
- Display tables
- Handouts

ACTIVITY

1. Begin Lesson 5 by reviewing the results of the Level 1 - Firewise in the Classroom Community Assessment Process. Engage students in a discussion about potential wildfire risk areas and Firewise recommendations.

2. Discuss and determine the format of the Community Report. Review assessment details. Emphasize that the educational information they will provide through the Community Report is a critical component of the Firewise process and will help the community and Minnesota DNR Firewise Program make decisions regarding the Firewise Community Plan for wildfire risk mitigation.

3. Direct student's attention to Firewise in the Classroom Community Assessment Process Student Guide Section 11, Firewise Community Report Summary Frame. Explain to students that the Summary Frame will help them organize the content of their Community Report.

4. Circulate and provide assistance as students begin working on their Summary Frames and creating their Community Reports.

5. Complete, practice, and present Community Reports.

6. Collect Community Reports. Share copies of Community Reports and presentation photos with the community, Minnesota DNR Firewise Program and media.

7. Debrief the Community Report experience. Reflect on the Firewise Community Assessment experience, the knowledge and skills gained, and the value of the data that students have provided to their community and state.

CONCLUSION

Answer any questions related to the day's topics.

ASSESSMENT

Informal - Firewise Student Guide - Section 11

Formal - Firewise Community Assessment Community Report

EXTENSION IDEAS

Share Community Reports with a broader audience through a school or community web site, local cable channel, local publication, additional public meetings, displays, etc.