Lesson Title	Hazards: Hurricane Tracking with ArcGIS
Length of Lesson	1.5 hours
Created By	Erin Anderson, Adam Lenz, Justin Warren
Subject	Geosciences
Grade Level	7-8
State Standards	Inquiry: 1h
DOK Level	DOK 2
DOK Application	Make observations and interpret
National Standards	5-8 grade: Standard A: Science as Inquiry
Graduate Research Element	The researchers use computer software to perform their respective research.

Student Learning Goal:
The students will gain experience interacting with GIS spatial information software and will be required to answer questions and make recommendations based on their findings.

State Standards
Seventh Grade 1: Design and conduct a scientific investigation utilizing appropriate process skills and technology. (H) Make relationships between evidence and explanations (DOK 2)

National Science Education Standards of Content 5-8
A (Science as Inquiry): Technology used to gather data allows scientists to analyze and quantify results of investigations

Materials Needed (supplies, hand-outs, resources):
Computer with Microsoft Silverlight installed (available for free download at http://www.microsoft.com/silverlight/), and access to http://www.esri.com/products where a free account to use ArcGIS can be setup, this map can be accessed at the following url:

http://www.arcgis.com/home/webmap/viewer.html?webmap=555207306b664e638aa27ee029852117

Power Point: INSPIRE_LP_Storm_Track_11_01_12_Intro_Presentation (attached)
Activity Handout: INSPIRE_LP_Storm_Track_11_01_12_Activity_Sheet (attached)

Lesson Performance Task/Assessment:
Note: Students will be encouraged to freely explore the GIS map and its features within the confines of this lesson. They will be grouped into pairs with each pair assigned to a computer on which they will play the role of analyst and interact with the ArcGIS software. They will be informed that a hypothetical hurricane is approaching the Mississippi gulf coast and that the GIS map they will be working with shows the

hurricane's predicted track and other pertinent information. The map is composed of several layers including: state and county boundaries base map, nuclear plant locations with an indicator for the Grand Gulf plant, the hurricane path, and the hurricane wind swath in the form of color coded circles of varying diameter to indicate approximate wind speeds. There are also a number of pop-ups to be explored which link to images of hurricane damage and points of interest in the area. A screenshot of the map can be seen in Figure 1.

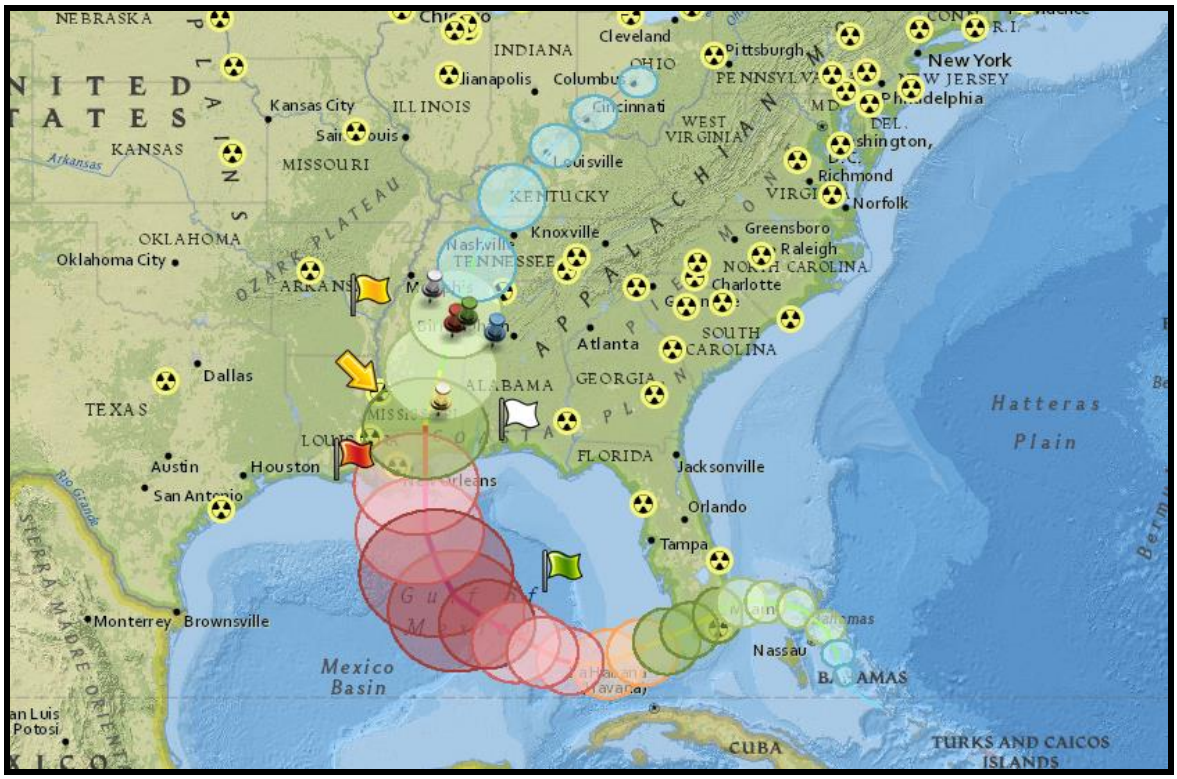

Figure 1. Screenshot of hypothetical hurricane GIS map

Each pair of analysts will answer the following 5 questions which will require them to interact with the GIS map.

1. What states will be affected by the hurricane based on the track?
2. What areas of Mississippi would you evacuate?
3. How will your town/school be affected by the hurricane?
4. The Grand Gulf nuclear power plant will automatically shut down if it experiences winds in excess of 75mph. Based on the GIS map, will the plant shut down?
5. Can you think of any other concerns which need to be raised based on the GIS map?

When approximately 20 minutes of the lesson remain, the pairs will take part in an instructor led group discussion to determine what recommendations they will offer to an assemblage of mock state government officials including the governor based on their interpretation of the GIS map.

The recommendations must include but are not limited to the following:

- A new nuclear power plant must be constructed. Where in Mississippi should the new nuclear plant be located, based on GIS map data?
- A mandatory evacuation for Mississippi has been declared. Which areas should be evacuated?

Lesson Relevance to Performance Task and Students:
The students will learn to manipulate the GIS map layers in order to answer afore mentioned questions as well as decide as a group what recommendations they will offer to the mock state government officials and governor.

Anticipatory Set/Capture Interest:
Students will view a simulated news report about an impending hurricane as a large group before splitting into their specialty GIS day groups.

Guided Practice:
The instructors will begin the lesson by discussing the hypothetical hurricane situation with the aid of a Power Point presentation. They will then outline what deliverables the students are responsible for: each pair answers the five questions and the entire group makes recommendations to mock state officials. Activity sheets will be passed out on which the five questions are listed. To introduce the students to the software functionality, an instructor will lead the students on a directed walk through of how to manipulate the ArcGIS map. This entire introduction should take approximately 15 minutes.

Independent Practice:
The students will complete the lesson in pairs while the instructors move about the room offering advice and answering questions.

Remediation and/or Enrichment:
Remediation: Individual IEP

Enrichment: If a student pair completes the lesson ahead of time, they will be encouraged to further investigate the GIS map.

Check(s) for Understanding:
Review activity sheet with students and have students practice what they can report out to the Governor about what they have determined using GIS about their topic (Evacuation,

Storm Track, Flooding). ALSO- select a couple of students who will do the reporting out to the whole group once all are gathered back together.

Closure:
Students will reconvene in the main room to report out to the Governor about their findings and to hear about what the other groups discovered using GIS.

Possible Alternate Subject Integrations
Geography, History

Teacher Notes:
Make sure all computers have the required software downloaded and that ArcGIS software runs smoothly on each one.

Be prepared for students to get off track because of the novelty of the GIS software.