Subject: Texas History  Grade Level: 7th

Unit Title: Geography of Texas Panhandle

Lesson Title: Aquifers: If you build it (windmill) they will come.

Approximate Time frame (50 minute = day/class period): 1 class period

Key Understanding(s):
People will settle where their basic needs can most easily be met.

Guiding Questions for Key Understanding(s):
In what region of Texas will you find the majority of population?
Where are the least populated areas of Texas?
What factors contributed to the settlement or lack of settlement in the arid parts of Texas?
How did people overcome the arid region of Texas?
How does a windmill bring water to the surface?

Performance Indicator(s):
Completed Map Comparison Worksheet
Completed Windmill research poster or Power Point presentation

Vocabulary of Instruction:
Arid
Aquifer
Various parts of the Windmill

Materials/Resources:
Printed or Projected Maps:
Texas Precipitation Map
http://www.humanflowerproject.com/index.php/weblog/comments/the_azalea_line
Texas Rivers Map
http://www.texasmaps.us/Texas-rivers-map.html
Texas Population Growth In Counties 1850-2040
http://txsdc.utsa.edu/Resources/Maps/Thematic/TotalPopulationGrowth.pdf
Texas Major Aquifers
http://www.twdb.state.tx.us/GAM/GAM_aquiferMap.htm
Map Comparison Worksheet (one per student)
Rubric Windmills

Advanced Preparation:
Copied documents listed above
Internet Access for projection & student research on windmills
Instructional Procedure:

- **FOCUS** – To engage the learner in this lesson, you want to encourage the students to think about having some item of value that they are not able to use. You might use the example of a bike; how much use is a bike if you don’t know how to ride it. As they ponder that scenario, tell them they will be looking at maps of Texas trying to discover what natural resource was overlooked or unused until the late 19th century.

- **EXPLORE** – Pass out the *Map Comparison Worksheet*. They may work with partners while you walk around the classroom and monitor or the students may work as a class with you as the facilitator reading the questions aloud. As the *Map Comparison Worksheet* dictates, display or project the maps – *Texas Precipitation Map, Texas Rivers Map & TX Pop Growth in Counties 1850-2040*.

- After students complete page 1 of the *Map Comparison Worksheet* bring them together as a class for the remainder of the discussion and completion of the worksheet.

- **EXPLAIN** – The panhandle and West Texas have water but it is under the ground. Display the *TX Mj Aquifers Map*. Discuss the map; then have them define aquifer on the back of their *Map Comparison Worksheet*. Have the students draw an illustration of an aquifer under their definition on the back of the *Map Comparison Worksheet*. (google > images >aquifer or use text book image for an illustration the students may recreate)

- Inform the students that windmills are used to draw the water from underground. Water wells and windmills helped to bring settlement into the arid regions of Texas.

- **EXPLORE** – Pass out the *Rubric Windmills*. The following websites will assist in student research:
  
  - http://www.aermotorwindmill.com/Links/Education/Index.asp

  FYI: if you have a school blog or web page it works well to post the web addresses on that Internet site so the students can just click on them in lieu of trying to retype them.

- **EVALUATE** – Completed *Map Comparison Worksheet* and *Windmill* presentation will allow teacher to gauge comprehension.

- **CLOSURE** – Allow students to present their finished *Windmill* project before the class.
Special Needs Adaptation: Check out illustrated books from the library or print information from the Internet and have Special Needs students evaluate the pictures.

GT Adaptation: Have students build a model of a working windmill.
http://www.educationbug.org/a/windmill-science-project.html