Cultural History along the Natchez Trace Parkway

Classroom Lesson:

GPS the NATT (HSGP)

- **Grade:** 8th-12th
- **Subject Areas:** Social Studies, Geography
- **Setting:** Classroom
- **Duration:** One class period
- **Skills:** Interpreting and plotting GPS coordinates, map reading
- **MS Objectives:** 4 b, c
- **Vocabulary:** Topography map, GPS, coordinates

Summary: Students will use GPS coordinates to plot a National Scenic Trail on a topography map.

Materials Needed: For each student or pair of students: One "no trail" topography map printed on legal size paper. Set of GPS coordinates for the National Scenic Trail. Pencil.

Instructional Information

MS Objectives:
Secondary:
4. Demonstrate the ability to apply and interpret social studies tools
b. Synthesize information from various representations of the earth
c. Interpret information using appropriate social studies tools

Learning Objectives: The students will be able to: Plot GPS points and show the location of a National Scenic Trail.

Teacher Set: This lesson assumes that students already know how to plot GPS coordinates. However, if they have never plotted GPS, if they can plot points on a graph, they can plot GPS coordinates with a short explanation.

Teacher Overview: (See Teacher Background for information on federal trails and how GPS works.) The National Park Service uses up-to-date technology to manage their lands. The Natchez Trace Parkway is a National Park Service unit, authorized to contain National Scenic Trails.

Student Instruction:
The students will either plot all of the given points or they may plot only the bolded points. Either set will give a more or less accurate representation of the National Scenic trail that runs along the Natchez Trace Parkway in the Tupelo, MS area. Orient the students as to the features on and the location represented by the map.

Student Task:
Look carefully at the topography map. Plot the GPS points on the maps. After you have all the points plotted on the map, draw a line to connect the points. This line will represent the National Scenic Trail that runs from West Jackson street in Tupelo, MS to the Visitor Center at Natchez Trace Parkway mile marker 266.

Teacher Closure: Student Assessment: Accuracy and completeness of the mapping activity.

Suggestions for re-teaching: In other mapping activities, have the students map GPS coordinates. Have the students research the origins and function of the GPS system.

Extension: Have the students visit a section of the Natchez Trace Scenic Trail. If appropriate equipment is available, have the students record GPS coordinates and then map the trail on a "blank" topography map.

Show an example of real-time satellite imagery have the students visit http://earthnow.usgs.gov/earthnow_app.html?sessionId=58f703891c63c55d1ab0e0eb379da548110504

Teacher Background:

National Trails System

There is no universal legal definition of a trail in the United States. One of the best, used for national recreation trails, is: ... *a travel way established either through construction or use which is passable by at least one or more of the following, including but not limited to: foot traffic, stock, watercraft, bicycles, in-line skates, wheelchairs, cross-country skis, off-road recreation vehicles such as motorcycles, snowmobiles, ATVs, and 4-wheel drive vehicles.*

Each trail will have regulations that indicate what mode of travel is allowed on that particular trail. Not all trails allow all types of travel.

National trails are officially established under the authorities of the National Trails System Act (16 USC 1241-51). There are several types:

- **National scenic trails are usually 100 miles or longer, continuous, primarily non-motorized routes of outstanding recreation opportunity. Such trails are established by Act of Congress. The Natchez Trace Parkway has a Scenic Trail system that is not continuous. In 1983 Congress authorized 95 miles of National Scenic Trail along the Natchez Trace Parkway. The entire Natchez Trace Parkway is considered part of the National Trail System.**
- **National historic trails commemorate historic (and prehistoric) routes of travel that are of significance to the entire Nation. They must meet all three criteria listed in Section 5(b)(11) of the National Trails System Act. Such trails are established by Act of Congress.**
- **National recreation trails, also authorized in the National Trails System Act, are existing regional and local trails recognized by either the Secretary of Agriculture or the Secretary of the Interior upon application.**

Until 1968, the only Federal role in trails was to build and maintain those on Federal lands. The National Trails System Act of 1968 made it Federal policy to recognize and promote trails by providing financial assistance, support of volunteers, coordination with States, and other authorities. As a result, 11 national scenic trails (NSTs) and 19 national historic trails (NHTs) have been established by law (and are administered by the National Park Service, the USDA Forest Service, and the Bureau of Land Management, depending on the trail); over 1000 national recreation trails have been recognized by the Secretaries of Agriculture and Interior; and 2 side-and-connecting trails have also been certified. In addition, other Federal statutes support and fund trails through programs such as FHWA's Recreational Trails Program and Transportation Enhancements programs, HUD block grants, and the NPS Rivers, Trails, and Conservation Assistance Program.

How GPS Works from http://www.nasm.si.edu/gps/work.html

"Global Positioning System satellites transmit signals to equipment on the ground. GPS receivers passively receive satellite signals; they do not transmit. GPS receivers require an unobstructed view of the sky, so they are used only outdoors and they often do not perform well within forested areas or near tall buildings. GPS operations depend on a very accurate time reference, which is provided by atomic clocks at the U.S. Naval Observatory. Each GPS satellite has atomic clocks on board.

Each GPS satellite transmits data that indicates its location and the current time. All GPS satellites synchronize operations so that these repeating signals are transmitted at the same instant. The signals, moving at the speed of light, arrive at a GPS receiver at slightly different times because some satellites are farther away than others. The distance to the GPS satellites can be determined by estimating the amount of time it takes for their signals to reach the receiver. When the receiver estimates the distance to at least four GPS satellites, it can calculate its position in three dimensions.

There are at least 24 operational GPS satellites at all times. The satellites, operated by the U.S. Air Force, orbit with a period of 12 hours. Ground stations are used to precisely track each satellite's orbit.

Determining Position
A GPS receiver "knows" the location of the satellites, because that information is included in satellite transmissions. By estimating how far away a satellite is, the receiver also "knows" it is located somewhere on the surface of an imaginary sphere centered at the satellite. It then determines the sizes of several spheres, one for each satellite. The receiver is located where these spheres intersect

The accuracy of a position determined with GPS depends on the type of receiver. Most hand-held GPS units have about 10-20 meter accuracy. Other types of receivers use a method called Differential GPS (DGPS) to obtain much higher accuracy. DGPS requires an additional receiver fixed at a known location nearby. Observations made by the stationary receiver are used to correct positions recorded by the roving units, producing an accuracy greater than 1 meter.

When the system was created, timing errors were inserted into GPS transmissions to limit the accuracy of non-military GPS receivers to about 100 meters. This part of GPS operations, called Selective Availability, was eliminated in May 2000."

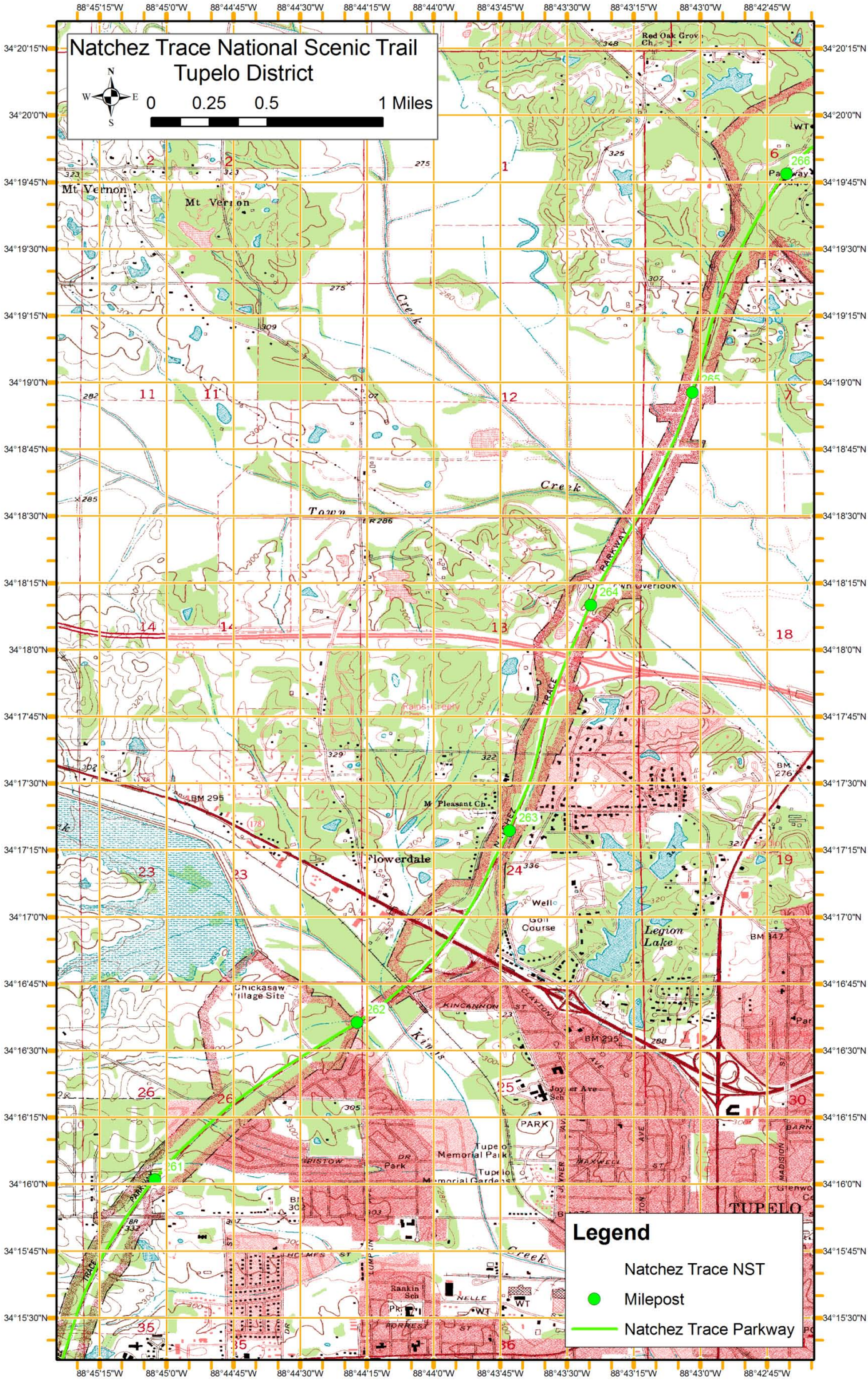
Teacher ‘s List of Coordinates and Landmarks

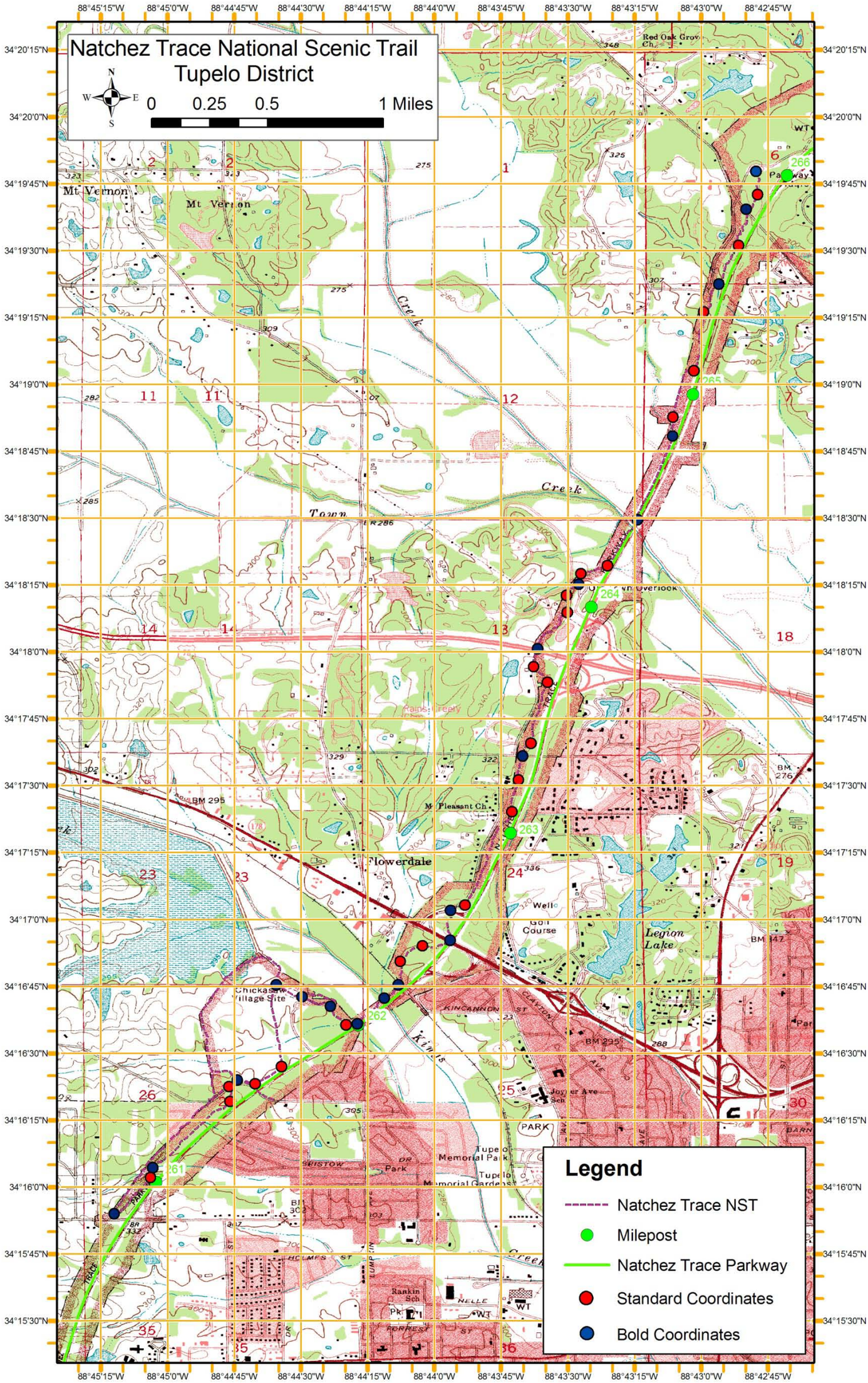
	Latitude			Longitude		
point	**hours**	**minutes**	**seconds**	**hours2**	**minutes2**	**seconds2**
VC trailhead	**34**	**19**	**48**	**-88**	**42**	**48**
	34	19	43	-88	42	47
Road intersection	**34**	**19**	**39**	**-88**	**42**	**50**
	34	19	31	-88	42	52
creek	**34**	**19**	**23**	**-88**	**42**	**56**
	34	19	16	-88	42	59
	34	19	3	-88	43	2
	34	18	53	-88	43	6
creek	**34**	**18**	**48**	**-88**	**43**	**6**
bridge	**34**	**18**	**30**	**-88**	**43**	**14**
	34	18	19	-88	43	21
	34	18	18	-88	43	27
Old Town	**34**	**18**	**15**	**-88**	**43**	**27**
	34	18	13	-88	43	30
	34	18	9	-88	43	30
HWY 78	**34**	**18**	**1**	**-88**	**43**	**37**
	34	17	57	-88	43	38
	34	17	53	-88	43	35
	34	17	40	-88	43	38
Road intersection	**34**	**17**	**37**	**-88**	**43**	**40**
	34	17	31	-88	43	41
	34	17	24	-88	43	42
	34	17	3	-88	43	53
McCullough ramp	**34**	**17**	**2**	**-88**	**43**	**56**
McCullough Blvd	**34**	**16**	**55**	**-88**	**43**	**57**
	34	16	54	-88	44	3
	34	16	51	-88	44	8
railroad tracks	**34**	**16**	**45**	**-88**	**44**	**8**
Kings Creek	**34**	**16**	**42**	**-88**	**44**	**11**
creek	**34**	**16**	**37**	**-88**	**44**	**17**
	34	16	36	-88	44	20
trail intersection	**34**	**16**	**40**	**-88**	**44**	**23**
trail intersection	**34**	**16**	**43**	**-88**	**44**	**30**
horse trail intersection	**34**	**16**	**45**	**-88**	**44**	**35**
	34	16	27	-88	44	35
	34	16	23	-88	44	41
trail intersection	**34**	**16**	**24**	**-88**	**44**	**44**
	34	16	23	-88	44	46
	34	16	19	-88	44	46
creek	**34**	**16**	**4**	**-88**	**45**	**3**
	34	16	2	-88	45	4
Jackson St. trailhead	**34**	**15**	**54**	**-88**	**45**	**12**

Map the GPS coordinates on the grid map. The coordinates are not necessarily in order.

Latitude			Longitude		
hours	minutes	seconds	hours2	minutes2	seconds2
34	19	43	-88	42	47
34	**16**	**43**	**-88**	**44**	**30**
34	**18**	**48**	**-88**	**43**	**6**
34	17	24	-88	43	42
34	18	53	-88	43	6
34	16	23	-88	44	46
34	**19**	**39**	**-88**	**42**	**50**
34	**16**	**45**	**-88**	**44**	**8**
34	18	13	-88	43	30
34	**16**	**40**	**-88**	**44**	**23**
34	19	3	-88	43	2
34	18	9	-88	43	30
34	17	53	-88	43	35
34	**16**	**37**	**-88**	**44**	**17**
34	19	16	-88	42	59
34	**16**	**45**	**-88**	**44**	**35**
34	17	3	-88	43	53
34	**18**	**30**	**-88**	**43**	**14**
34	**16**	**55**	**-88**	**43**	**57**
34	17	40	-88	43	38
34	**19**	**48**	**-88**	**42**	**48**
34	**18**	**15**	**-88**	**43**	**27**
34	16	54	-88	44	3
34	**18**	**1**	**-88**	**43**	**37**
34	16	19	-88	44	46
34	**17**	**2**	**-88**	**43**	**56**
34	16	51	-88	44	8
34	18	19	-88	43	21
34	**16**	**42**	**-88**	**44**	**11**
34	**17**	**37**	**-88**	**43**	**40**
34	16	36	-88	44	20
34	16	27	-88	44	35
34	17	57	-88	43	38
34	**16**	**4**	**-88**	**45**	**3**
34	19	31	-88	42	52
34	**16**	**24**	**-88**	**44**	**44**
34	18	18	-88	43	27
34	16	2	-88	45	4
34	17	31	-88	43	41
34	**15**	**54**	**-88**	**45**	**12**
34	16	23	-88	44	41
34	**19**	**23**	**-88**	**42**	**56**

NAME_____



Natchez Trace National Scenic Trail
Tupelo District
0 0.25 0.5 1 Miles
Legend
Natchez Trace NST
Milepost
Natchez Trace Parkway
Mt Vernon
Town Creek
Flowerdale
Legion Lake
Chickasaw Village Site
Tupelo Memorial Park
TUPELO

Teacher Answer Sheet