

Name(s): _____

Date: _____

Evolving Patterns



Ecologists at the University of California at Davis are studying changes in vegetative patterns in the Sierra Nevada foothills and mountains using data going back to the Wieslander studies of the 1930s and similar inventories from the last few decades. They have noticed a number of changes in the area's vegetation both in type and extent - changes that you will be able to examine in the exercises below.

- 1) Study the succession of El Dorado County vegetation maps from 1934 to 2002. Describe any general patterns that you notice.

- 2) Open the **2002** vegetation data table and identify by species name the types of vegetation that grow in each of the Grid Code regions listed:

Grid Code	General Type of Vegetation	Species Included
8	Conifer Forest	
4 & 7	Hardwood Woodland & Hardwood Forest	
1	Chaparral	

(**CHECK:** The Grid Codes for 1934 are different than for 1945, 1977, and 2002)

- 3) Measure and record the extent of each of the vegetation types listed in the table below. Describe your general observations.

Extent (Acres) of Vegetation Types in El Dorado County			
Year	(8) Conifer Forest	(4) Hardwood Woodland or (7) Hardwood Forest	(1) Chaparral
1934			
1945			
1977			
2002			

- 4) The ability of particular vegetation to thrive in a region like California's Mother Lode is related in part to elevation. Zoom in on the **Pleasant Valley** area south of Placerville and switch to the **Topographic** base map. For each of the **1945**, **1977**, and **2002** layers switch display to the **Primary Vegetation** field. Adjust the transparency of the layer so that you can read the topographic map beneath. Limit yourself to this one region and carefully study the locations of each specific species. Record the approximate average minimum or maximum elevations at which each grows in the table below.

Minimum/Maximum Elevation			
Year	Ponderosa Pine	Douglas Fir	Hardwoods
	Minimum	Minimum	Maximum
1945			
1977			
2002			

The UC Davis ecologists claim that “... above 700 m [~2300 feet], Ponderosa Pine contracted while Montane hardwood, Montane hardwood conifer, and Douglas fir expanded.¹” Do your observations in the **Pleasant Valley** region support this conclusion? Explain.

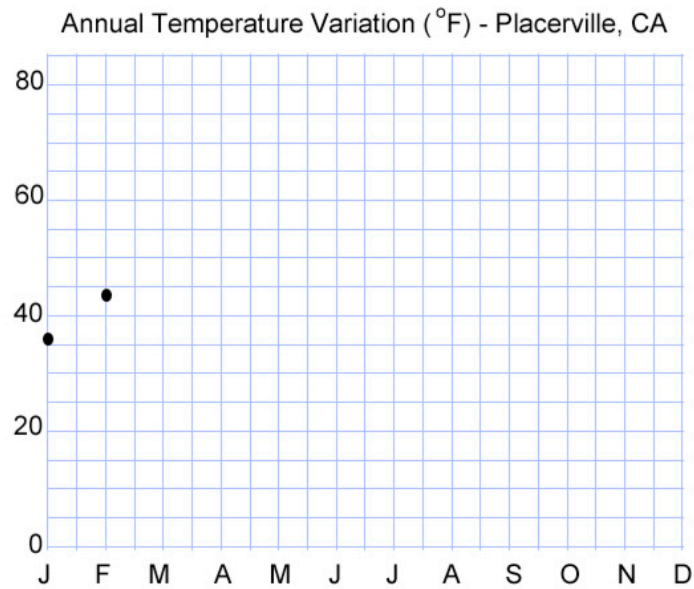
- 5) A changing climate may also be one of the factors in the vegetative changes in the Sierras. The table below provides the monthly averages for every five years for 1955 to 2005 recorded in Placerville, California, just north of the **Pleasant Valley** region you are studying.

Placerville, California - Average Monthly Temperatures (°F) - 1950 to 2005												
Year	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005
Jan	36.64	36.65	40	41.68	44.26	43.06	44.98	41.84	44.69	47.03	47.48	46.73
Feb	43.23	40.68	42.53	43.43	48.09	44.36	47.62	47.59	43.39	52.75	49.44	51.39
Mar	46.66	46.42	50.66	46.87	48.5	45.94	46.03	44.53	51.92	49.37	51.63	52.53
Apr	55.71	46.78	52.78	50.97	48.37	46.97	53.64	57.22	58.72	53.43	58.7	54.37
May	58.77	57.48	57.53	57.69	61.73	60.42	57.33	58.68	59.6	58.84	62.48	61.76
Jun	66.13	64.32	72.95	61.97	68.37	67.63	62.29	71.73	67.97	66.37	74.64	66.35
Jul	76.29	68.73	77.37	70.87	75.87	71.73	72.38	78.76	76.55	73.85	73.78	82.55
Aug	73.77	72.79	72.4	71.39	72.98	70.63	70.94	73.27	74.81	76.6	76.52	80.61
Sep	66.79	66.68	69	61.47	66.87	71.62		63.23	70.75	72.25	71.43	68.33
Oct	58.81	57.82	56.37	59.74	57.06	55.45	58.4	59.77	65.6	65.11	61	61.85
Nov	51.75	46.07	46.25	47.83	50.08	46.43	49.42	46.2	51.02	57.73	47.37	55.5
Dec	45.41	44.61	40.84	38.95	39.82	43.37	45.82	46.21	40.61	47.65	50.08	48.32
Annual	58.06	54.09	56.56	54.4	56.83	55.63	54.66	57.42	58.8	60.08	59.94	63.22

data from the [Western Regional Climate Center](#)

Study the numbers and describe general changes in average temperatures that you see over the fifty years of data.

- 6) A graph for the year 1950 is started for you below. Complete a line graph for the year joining each point month-to-month.



- 7) Work with classmates dividing up the years from 1955 to 2005. Each of you should add another year to your own 1950 graph using a different color for the new year. When you are done post your results chronologically on the wall for everyone to study. Write a short summary describing your conclusions.

- 8) (**Extra** - Test your algebra skills) Select a month of the year and plot the average temperature for that month from 1950 to 2005 on the blank graph. Construct a line of best fit and determine its equation. Interpret the equation as it applies to the average annual change in temperature.



While forestry is the dominate use of land in El Dorado County, there are other important uses - agriculture and ranching, for example

- 9) Turn to the **Land Use** layers in your data. Examine each layer sequentially from 1984 to 2006. Describe the general changes in land use in El Dorado County that you observe.



- 10) One significant change is obviously in the extent of land designated as **Urban**. Determine the extent of **Urban** land for each of the four time periods.

Year	Extent (Acres) of Urban Land in El Dorado County
1984	
1990	
1996	
2006	

- 11) If the amount of **Urban** land grew it had to come at the expense of other uses. From what type(s) of land did this growth in **Urban** land come? Explain.

¹James Thorne, et. al., "Vegetation Change Over Sixty Years in the Central Sierra Nevada, California, USA," Madrono, Vol. 55, No. 3, pp. 223-237, 2008.