

The effects of climate change on the Ennis, Montana Area

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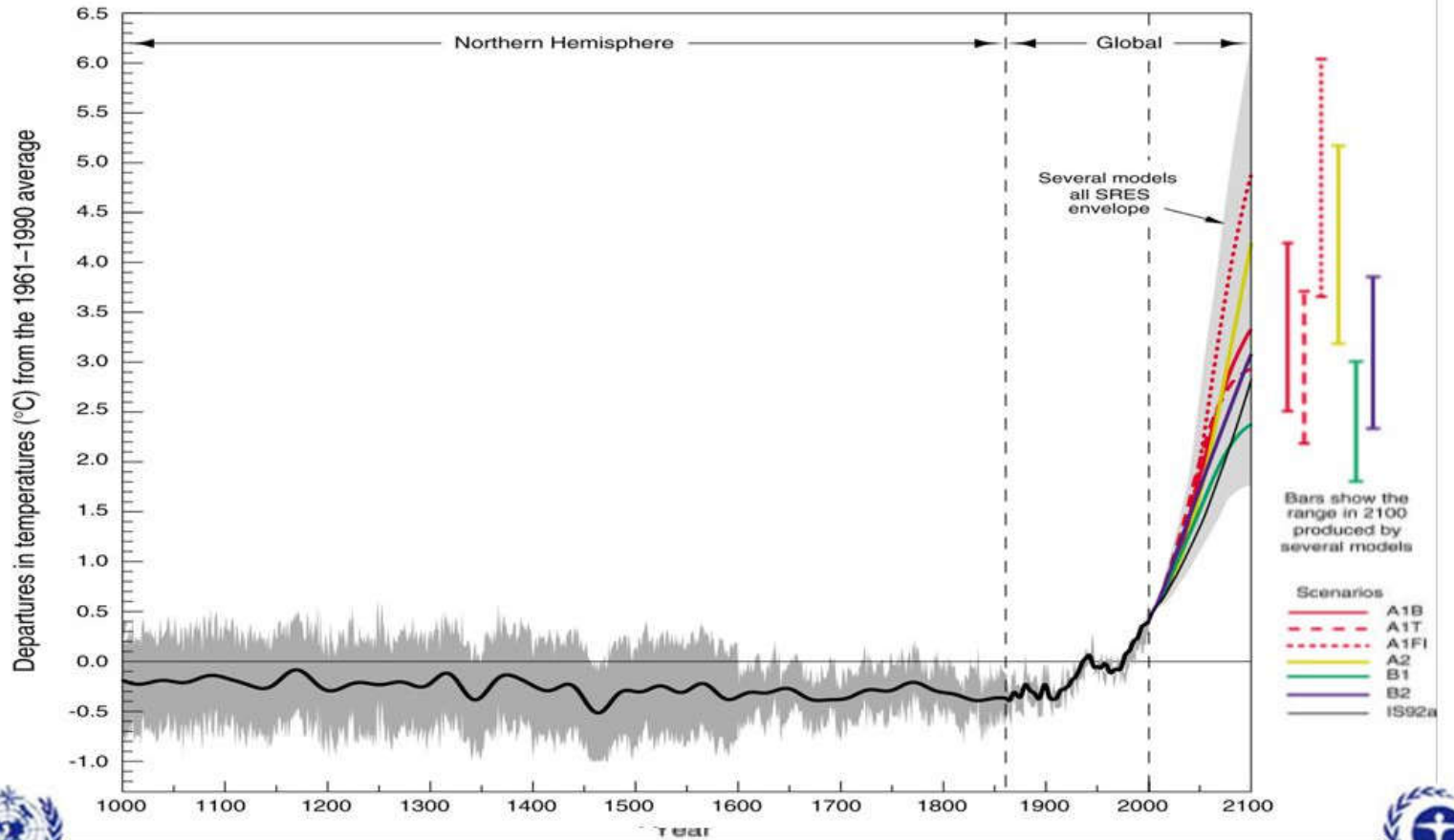
From the Executive Summary of the United States Global Change Research Program transmitted to the Congress and the President

“Observations show that warming of the climate is unequivocal. The global warming observed over the past 50 years is due primarily to human-induced emissions of heat-trapping gases. These emissions come mainly from the burning of fossil fuels (coal, oil, and gas), with important contributions from the clearing of forests, agricultural practices, and other activities.”

“Warming over this century is projected to be considerably greater than over the last century. The global average temperature since 1900 has risen by about 1.5°F. By 2100, it is projected to rise another 2 to 11.5°F. “

Display of past and possible future global temperatures

Global Mean Temperature Change

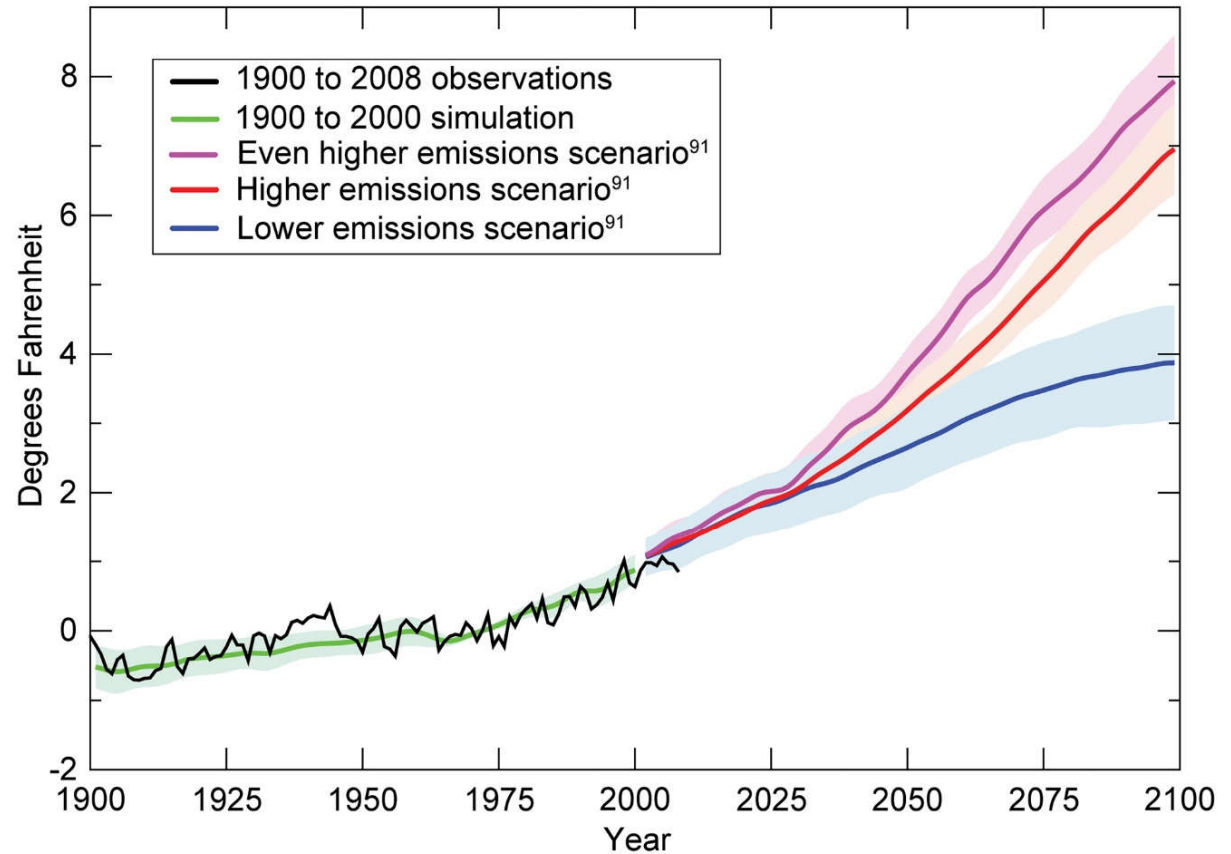


INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)



Display of recent and possible future global temperatures. A more recent estimate.

With the US withdrawal from the Climate Accords the “Lower emissions scenario” is no longer probable. This predicted a 4 degree rise by the end of the century. Current projections are for at least a 7 degree rise.



Smith *et al.*⁷²; CMIP3-A⁹³

Observed and projected changes in the global average temperature under three IPCC no-policy emissions scenarios. The shaded areas show the likely ranges while the lines show the central projections from a set of climate models. A wider range of model types shows outcomes from 2 to 11.5°F.⁶⁸ Changes are relative to the 1960-1979 average.

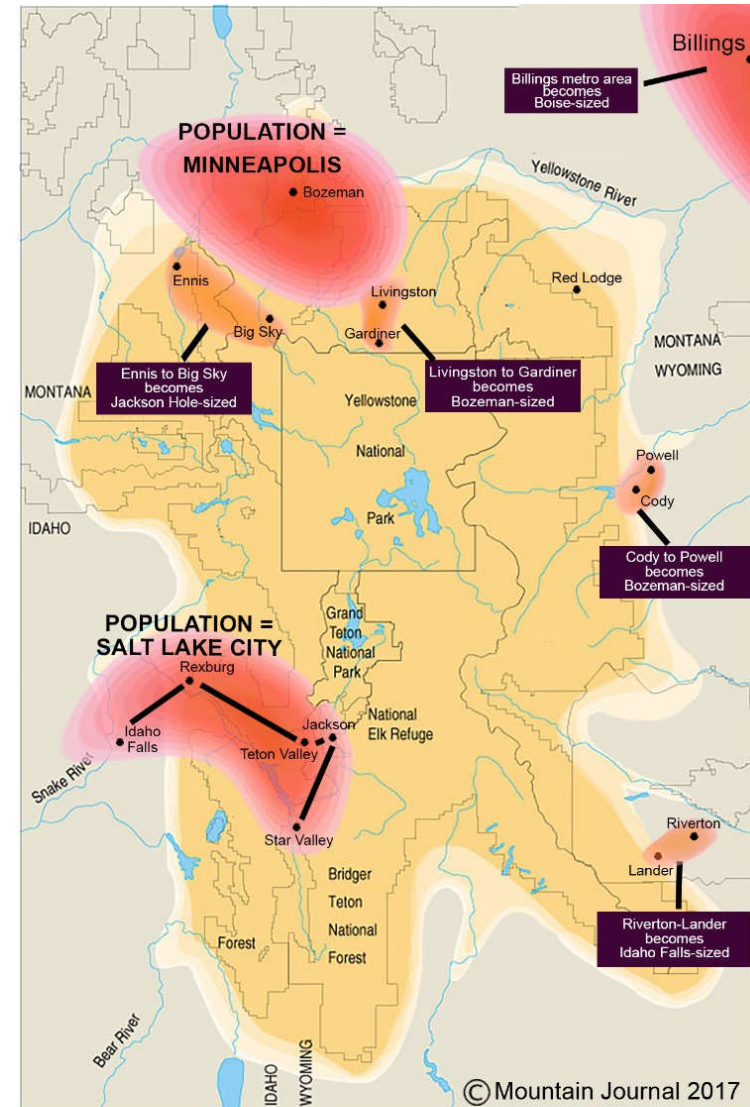
What about the Ennis area?

**This is from an article in the Mountain Journal, September 10, 2017:
Just based on current population growth patterns the Ennis-Big Sky
area is projected to grow to about the size of the current Jackson, WY
area by 2065**

**“Bozeman/Gallatin, by 2041, will equal the size of Salt Lake City
proper (minus its suburbs). Even more sobering, in less than half a
century, 2065, based on the same rate of annual growth, there will be a
population of 420,000 here, equal to present-day Minneapolis proper.
And Carpenter says that could actually be a conservative estimate,
with this scenario arriving faster than people think. “**

What about the Ennis area?

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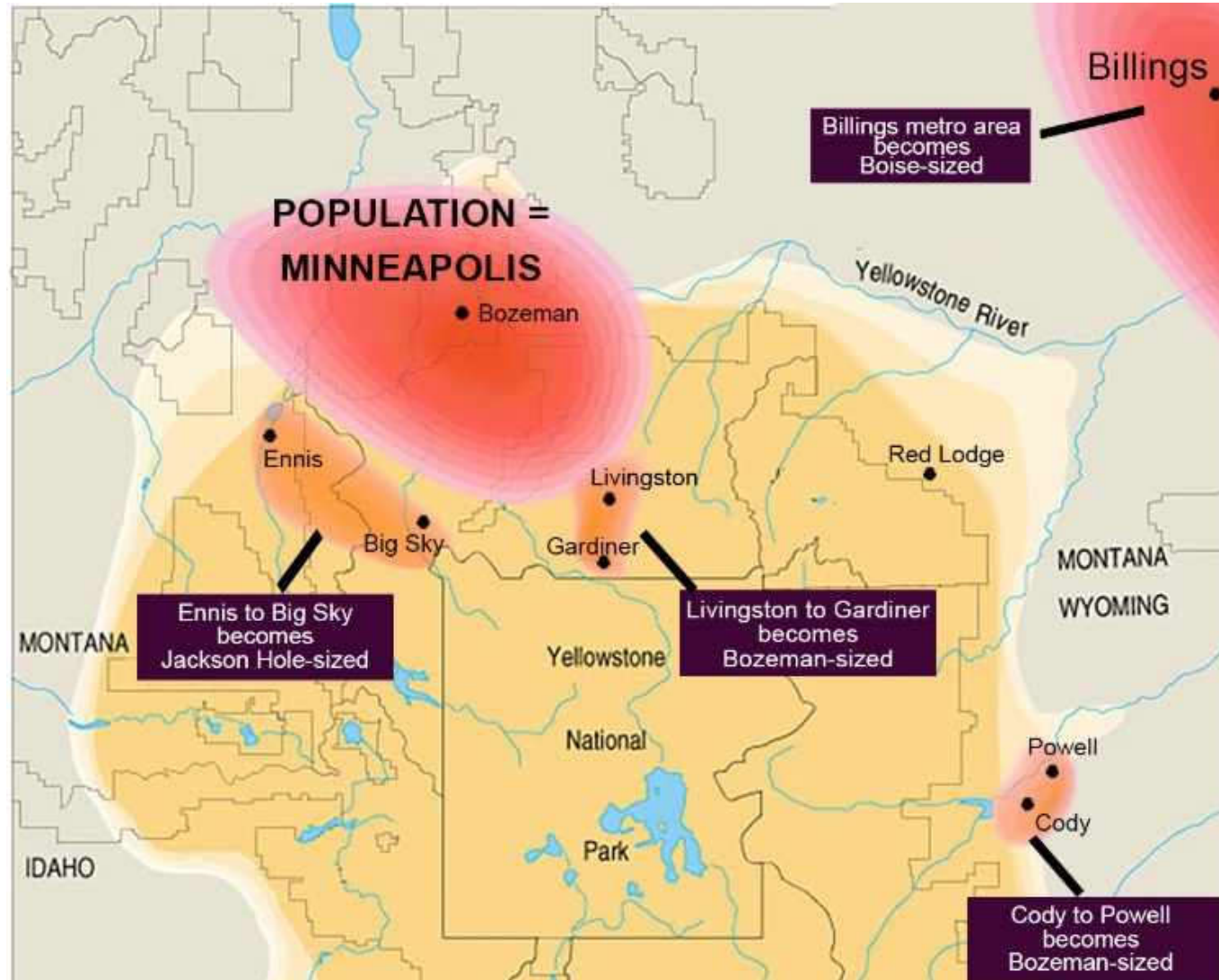


Predicted population growth in Greater Yellowstone Ecosystem by 2065

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Climate Migration

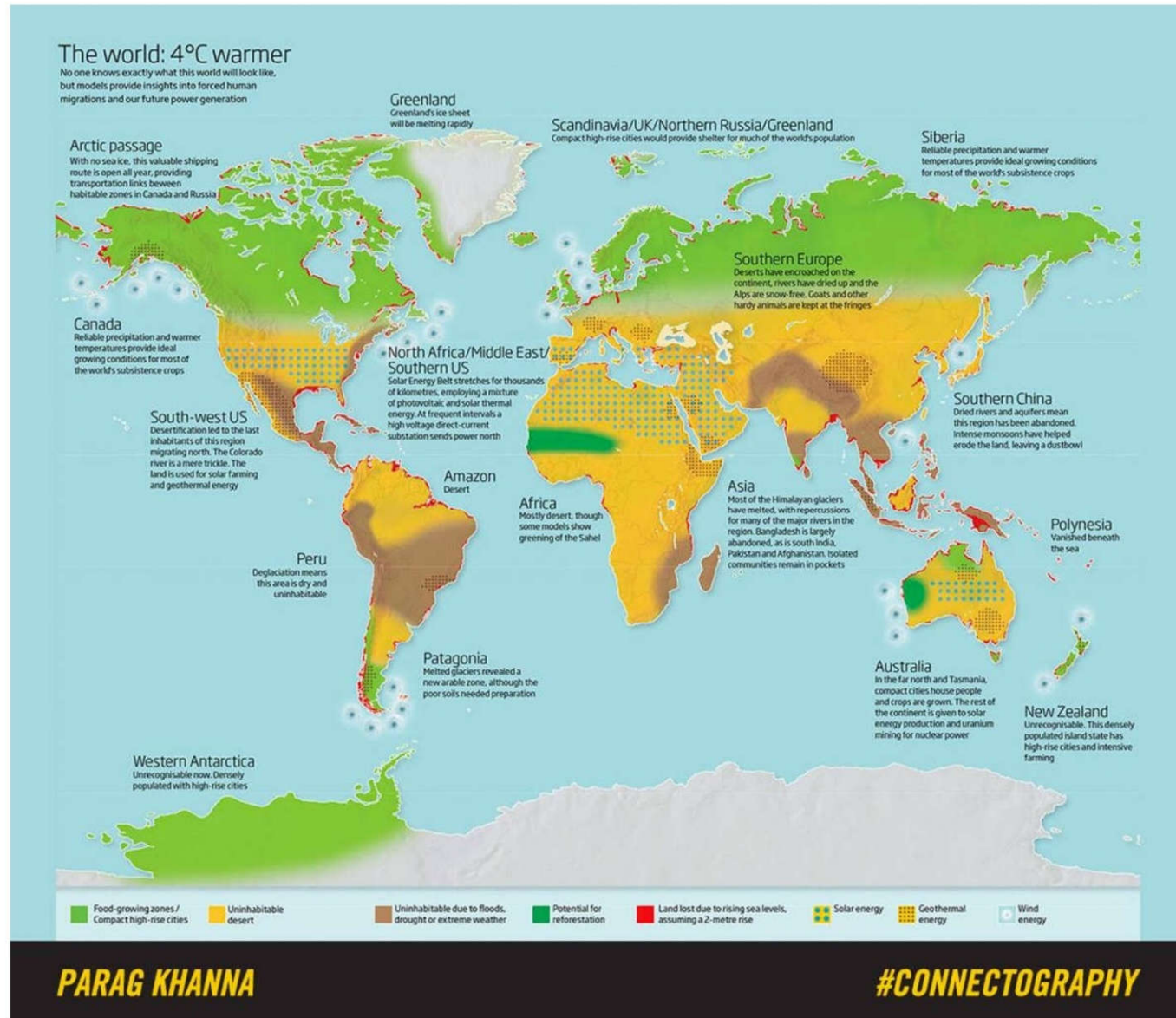
From the same article: “And then you look at Houston and Hurricane Harvey and Florida and Hurricane Irma, and Phoenix broiling in 120-degree heat, the water shortages coming to cities in the desert Southwest, and the fires in southern California,” Carpenter says from the slope of the Bridgers. “The current explosive growth in Greater Yellowstone is happening because the region is attracting a lot of people coming here with a lot of money wanting to live quieter lives closer to nature. They are the first big wave.”

That alone, he says, is creating a nightmare of cascading growth-related issues, to which leadership in the Greater Yellowstone Ecosystem is either unable, unwilling or ill-equipped to confront.

“But how are the counties and towns going to handle [a potential flood of climate refugees](#) on top of the current inundation?” Carpenter asks. He doesn’t even need to speak the answer.

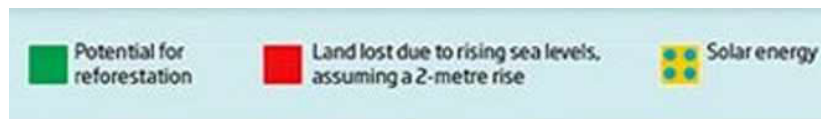
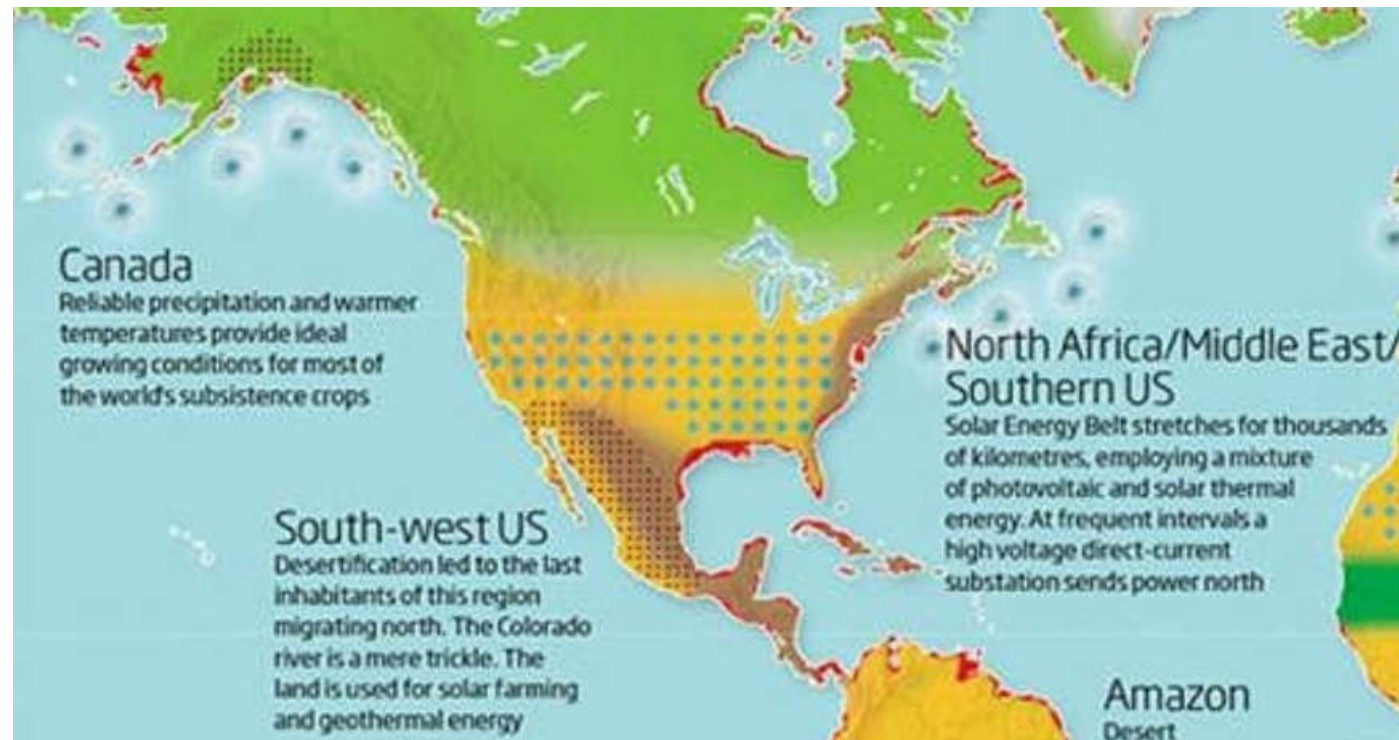
The world with a 7 degree rise in temperature

4 degrees centigrade is about 7 degrees Fahrenheit.



North America with a 7 degree rise in temperature

The southern US will become a desert with the forced migration of tens of millions of people to the north. This will be somewhat mitigated by advances in technology.



Climate Migration and Ennis

From the previous slide it appears the Ennis area may remain about the same in terms of rain and snow fall, although the snow will melt earlier so that stream flows in summer will be lower. This combined with rising maximum temperatures may doom trout in our rivers. Elk and other animals will also be affected adversely.

The major effect will come from increased migration of the population to the north. This will come because of the inundation of these areas by desert conditions. These will include the drying up of the Colorado and Sacramento rivers. With no water the populations will be forced to migrate to the northern US and Canada.

Climate Migration and Ennis

It is impossible to predict the exact expected population of the Madison Valley by the year 2050 and beyond, but it could easily be 100,000 plus.

The limiting factor will be our **water resources. Areas such as the west bench aquifer being studied by the MBMG/GWIP/Montana Tech could be severely affected. Parts of this area could be without water from wells if the population becomes too large and the water table falls or disappears. There may not be enough water entering the system to sustain a large population in the Madison Valley.**

These factors must be considered by the Town and Zoning Commissions of Ennis, by the County Commissioners, and the State and National Governments.