Observed Climate Change and the Negligible Global Effect of Greenhouse-gas Emission Limits in the State of New Mexico

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EXECUTIVE SUMMARY

In this report, we review New Mexico's long-term climate history and find little in the way of evidence that greenhouse gas build-up in the atmosphere has altered New Mexico's climate. Instead of long-term changes, short-term variability dominates the state's average temperature, precipitation, and drought frequency. Current temperatures are not all that different than the ones observed at the beginning of the last century—100 years ago. And a long-term look back more than 2,000 years into the state's moisture history shows that until very recently, the state's natural climate was characterized by much, much drier conditions. Other research shows that variability in the state's moisture conditions can be tied to oscillations in patterns of sea surface temperatures in the Atlantic and Pacific Oceans—oscillations which are part of the earth's natural cycles. Cycles of wildfire can also be traced back to these same oceanic patterns. Further, scares of increasing tropical diseases and a rising sensitivity to excessive heat are easily shown to be misapplication of the true facts.

Additionally, we analyze what the impacts on future climate change will be if New Mexico ceased *all* of its greenhouse gas emissions, now and forever. What we find is eye-opening. Even a complete cessation of greenhouse emissions from New Mexico will likely slow the future rate of global warming by less than two *thousandths* (<0.002) of a ºC per century. The impact of sea level will be an equally meager one *hundredths* of an inch. These changes are scientifically and realistically meaningless.

What's worse, is that greenhouse gas emissions are increasing so rapidly in China, that new emissions from that country will completely subsume the entirely of New Mexico's emissions cessation in little more than 6 week's time! Clearly, any plan merely calling for *reductions* in greenhouse gas emissions will fare even poorer. There is simply no climatic gain to be had from emissions reductions in New Mexico.

All told, New Mexico has been little impacted by global "climate change" and regulations prescribing a reduction in the state's greenhouse gas emissions will have no detectable effect on future climate change. Unfortunately, the same can't be said about the impact of emissions regulations on the state's economy, which have been projected to be large and negative. As such, state and/or federal plans aimed at limiting the state's greenhouse gas emissions presents a perfect recipe for an all pain, no gain outcome for New Mexico's citizenry.

In this report, we review New Mexico's long-term climate history and find little in the way of evidence that greenhouse gas build-up in the atmosphere has altered New Mexico's climate.

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Greenhouse gas emissions are increasing so rapidly in China, that new emissions from that country will completely subsume the entirely of New Mexico's emissions cessation in little more than 6 week's time!

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Observed Climate Change in New Mexico

Annual Temperature: The historical time series of statewide average annual temperatures for New Mexico, as complied by the U. S. National Climatic Data Center, begins in 1895. The past 116 years have been characterized by strong decadal scale variability and a weak overall warming trend of less than 1°F per century. Relatively cool conditions occurred from the 1910s to the early 1930s with conditions then warming up through the early 1950s. For several decades thereafter, there was a general cooling tendency. Since the mid-1970s a warming trend is evident, although it seems to have peaked in the early 2000s and statewide temperature have declined in the decade since—perhaps indicating the beginning of another multi-decadal cooling episode, such as those which have occurred twice before since the beginning of the 20th century.

New Mexico Statewide Annual Temperatures, 1895-2010

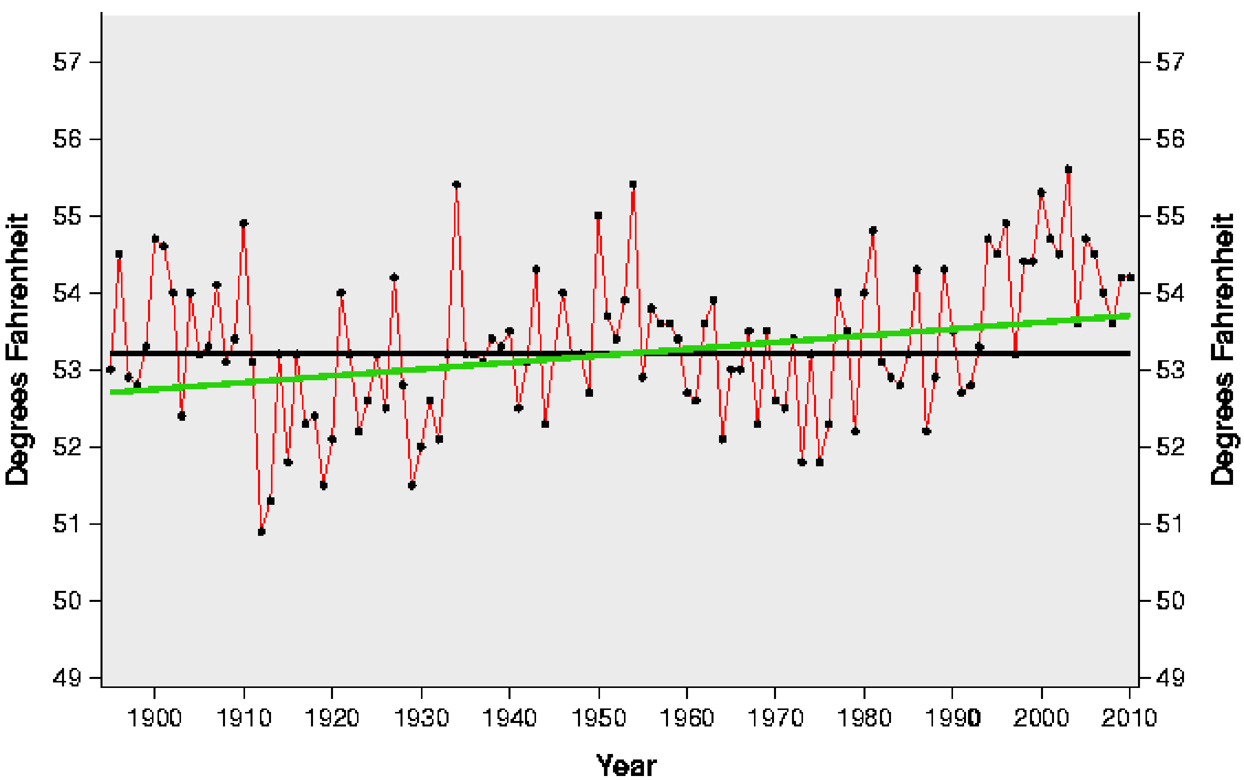

Figure 1. *Annual statewide average temperature history for New Mexico, 1895-2010 (available from the National Climatic Data Center, http://www.ncdc.noaa.gov/oa/climate/research/cag3/nm.html).*

Seasonal Temperatures: When New Mexico's statewide average temperature history is examined within each of the four seasons of the year, it can be seen that interannual and interdecadal variations are quite large. Warm periods are frequently interspersed with relatively cooler periods. Note that conditions in recent years do not stand out as being particularly unusual.

New Mexico Seasonal Temperatures, 1895-2010

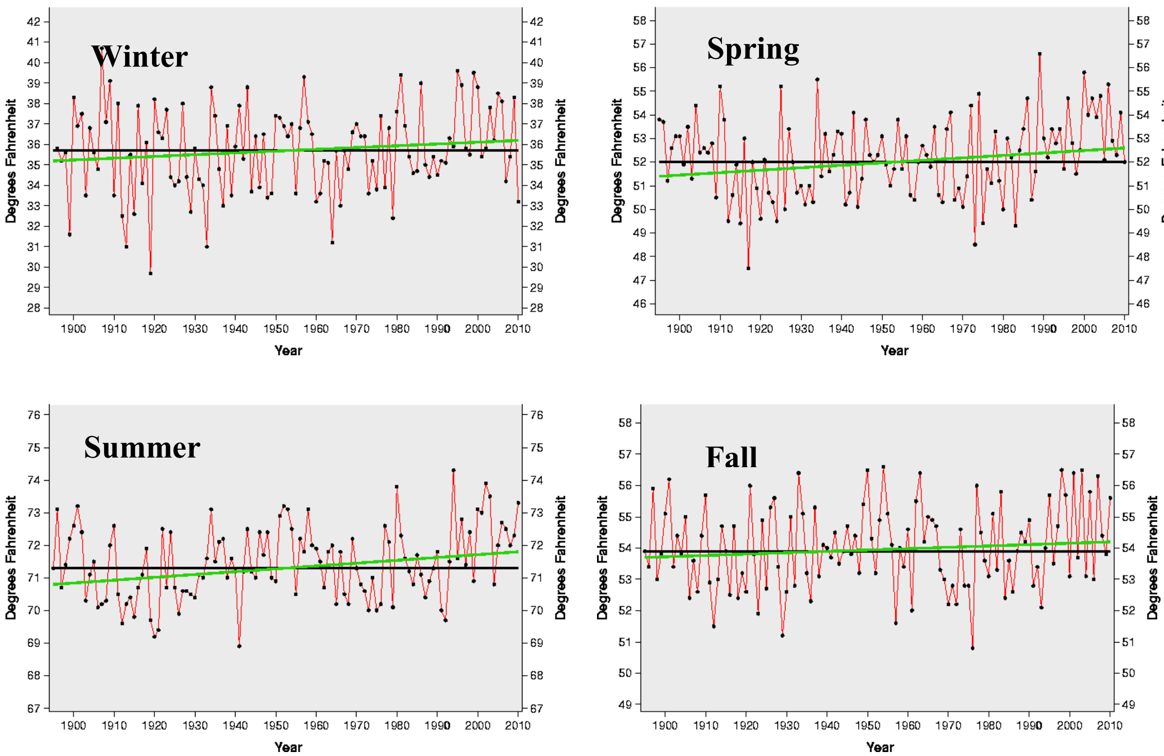

Figure 2. *Seasonal statewide average temperature history of New Mexico (source: National Climatic Data Center, http://www.ncdc.noaa.gov/oa/climate/research/cag3/nm.html).*

INFLUENCES ON THE OBSERVED TEMPERATURE IN NEW MEXICO

When examining the temperature history of New Mexico, it is important to recognize that the entirety of the warming that appears in the compiled temperature history of the state may not be evidence of regional (or large-scale) climate change, but instead may be caused by non-climatic influences on the local thermometers. Such influences may include changes in instrumentation, as well as changes in the local environment surrounding the thermometer location. That such changes have occurred which may impact the local temperature readings across the state has been documented in several recent reports.

A report highlighting the conditions of the environment in the immediate vicinity of thermometers was recently prepared by Anthony Watts and titled “Is the U.S. surface temperature record reliable?” Watts provides examples of some of the poor siting of the various “official” thermometers around the state, illustrating issues that may call into question the accuracy of the state’s long-term temperature history. Figure 3 illustrates just two of many “official” temperature observing sites in New Mexico in which the temperature history may reflect influences other than large-scale climate variability. The surroundings of New Mexico’s

other "official" observing stations are detailed at the website surfacestations.org (http://gallery.surfacestations.org/main.php?g2_itemId=203). A scientific study by Pielke et al. (2007) also documents problems with long-term U.S. temperature datasets that may give rise to anomalously high rates of warming.

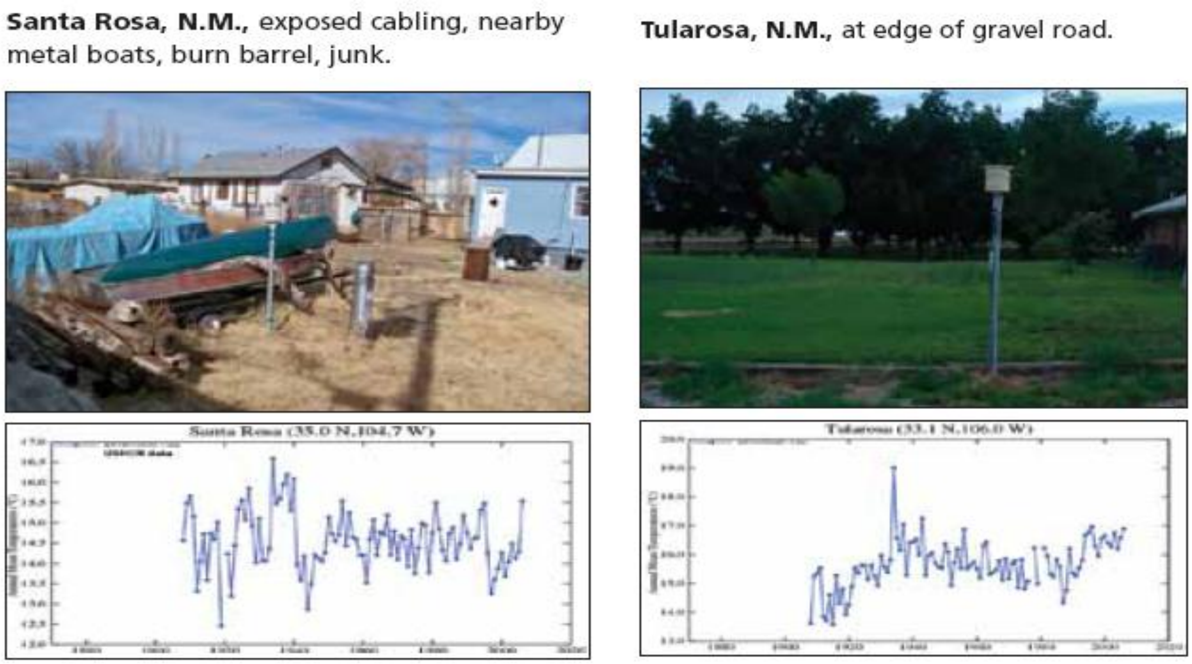

Figure 3. *Examples of poor situated "official" temperature recording stations in New Mexico. The photograph shows the immediate surroundings of the thermometer and the graph below shows the temperature history from the observing location (source: Watts, 2009).*

PRECIPITATION: Averaged across the state of New Mexico for each of the past 116 years, statewide annual total precipitation exhibits just a slight increase. Instead, as is the case with temperatures, annual-to-decadal-scale variations dominate the state's precipitation history. The behavior and patterns of precipitation in recent years are unremarkable when properly set against the long-term behavior. New Mexico's annual precipitation has varied from as much as 27.06 inches falling in the extremely wet year of 1941 to a little as 6.55 inches in the especially dry year of 1956. Clearly, unusually wet and dry years can and do occur within the natural variability of the state's climate.

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New Mexico Annual Precipitation, 1895-2010

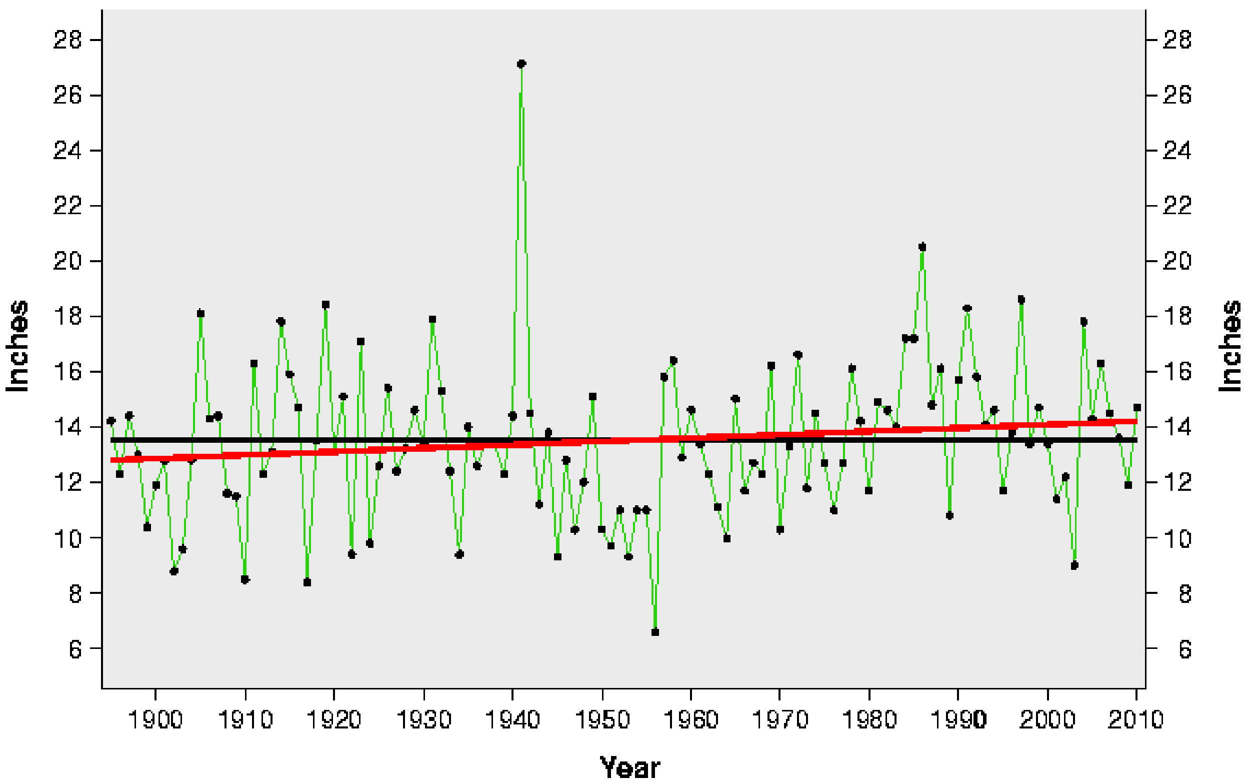

Figure 4. *Statewide average precipitation history of New Mexico, 1895-2010 (source: National Climatic Data Center, http://www.ncdc.noaa.gov/oa/climate/research/cag3/nm.html).*

DROUGHT: Since 1895, there has been no long-term trend of drought in New Mexico. Again, annual and decadal variability prevail.

Monthly mean Palmer Drought Severity Index values—a standard measure of moisture conditions that reconciles inputs from precipitation and losses from evaporation—show no trend during the past 116 years. The period of record is dominated by short-term variations that clearly illustrate that both dry periods and wet periods are not uncommon in the climate of New Mexico. The very wet period during the early 1940s stands out, as does the extended drought during the 1950s.

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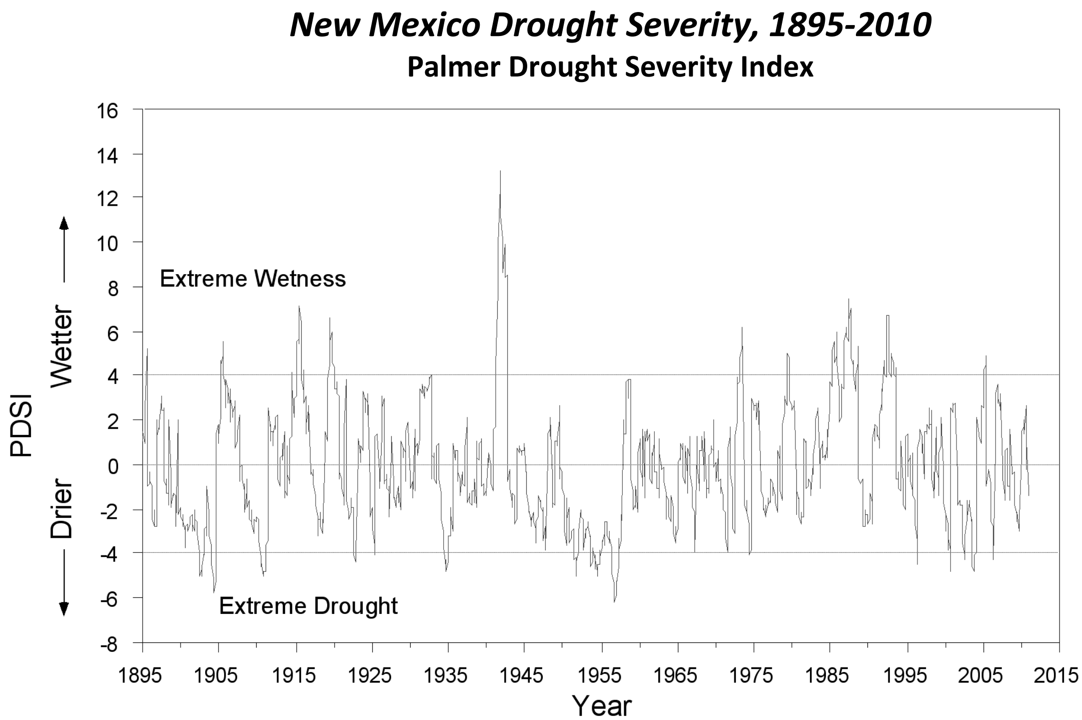

Figure 5. *Monthly statewide average values of the Palmer Drought Severity Index (PDSI) for the state of New Mexico, 1895-2010 (data from the National Climate Data Center, www.ncdc.noaa.gov)*

PALEODROUGHT: The droughts experienced during the past century in New Mexico pale in comparison to the megadroughts that have occurred there in the more distant past.

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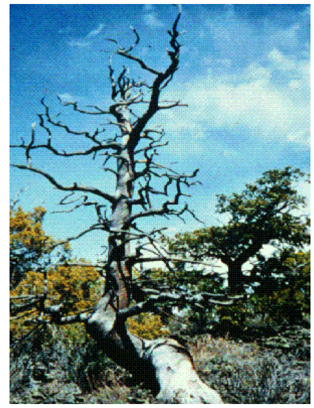
The character of past climates can be judged from analysis of climate-sensitive proxies such as tree-rings that preserve the growth history of trees in response to precipitation conditions. One such tree-ring study traced the history of precipitation in New Mexico back more than 2,000 years. The results of the study were summarized this way, at the National Climatic Data Center's Paleoclimate web page (http://www.ncdc.noaa.gov/paleo/drought/drght_home.html):

> Extraordinarily long-lived trees have been found growing in the El Malpais volcanic field of west-central New Mexico. Although it seems incongruous to find long-lived trees growing in the seemingly harsh environment of these relatively recent (3,000-115,000 years) lava fields, there are good reasons why these trees exist in this area. The lava flows have created kipukas (isolated areas of original substrate and vegetation surrounded by more recent lava flows) that have escaped disturbances such as fire, grazing, logging, and agricultural practices, because of their isolation. The lava field also

appears to trap and retain moisture in this otherwise arid environment, creating a habitat favorable to tree growth.



The oldest living tree found at this site is a 1274-year old Douglas-fir, the oldest known tree of this species in North America. Samples from this and other old trees were augmented with subfossil wood, from logs and remnants of living trees, to generate a 2129-year tree-ring chronology extending back to136 BC.

Not only are the El Malpais trees old, but they are sensitive to precipitation and thus, excellent recorders of past rainfall. The chronology was used to reconstruct annual precipitation for northwestern New Mexico for the past two millennia, as shown in the graph [Figure 5] (the units are standard deviation from the mean). The top graph shows the reconstruction for the years 1700-1992. The 1950s drought was the most severe drought 20th century drought in this region, but when viewed in the context of the past three centuries, it appears to be a fairly typical drought. **However, when the 1950s drought is compared to droughts for the entire reconstruction, back to 136 BC [Figure 6 bottom], it is clear that the 1950s drought is minor relative to many past droughts.** A number of the severe droughts of the past spanned several decades, the most recent occurring in the second half of the 16th century. [Emphasis added.]

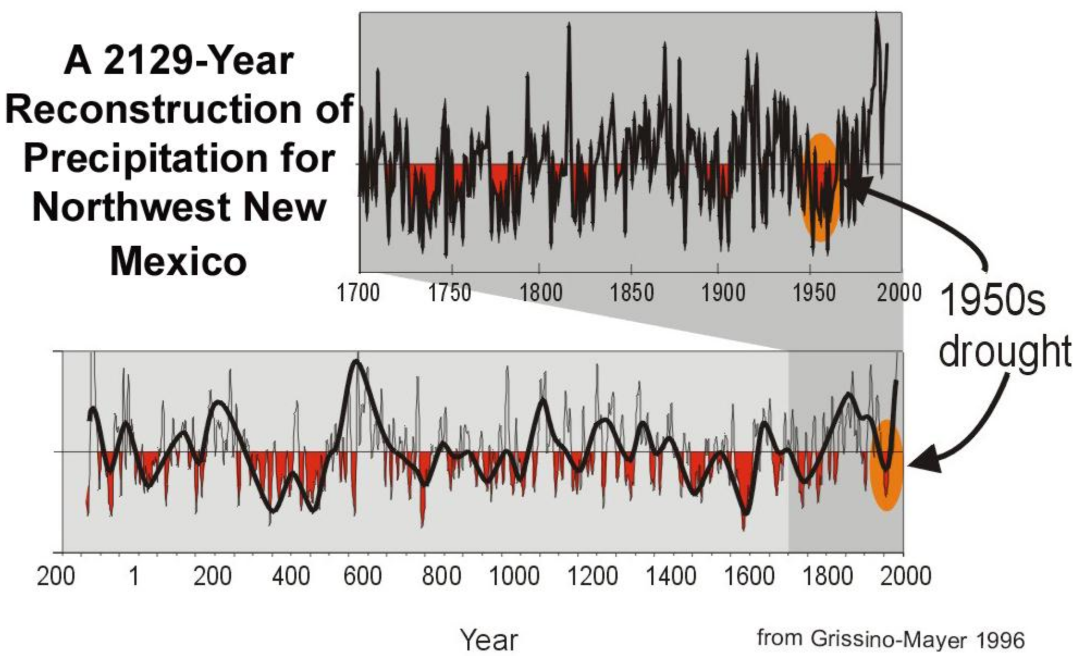


Figure 6. *A tree-ring reconstructed precipitation history for Northwest New Mexico since 136B.C. (National Climate Data Center, http://www.ncdc.noaa.gov/paleo/drought/drght_ grissno.html)*

As the precipitation reconstruction demonstrates, a remarkable characteristic of the precipitation history of New Mexico is the prolonged dry periods and megadroughts that occurred many times in past centuries—droughts that dwarfed any conditions experienced in recent memory. In fact, most of the past 2,000 years is characterized by conditions that are far drier than the average conditions of the 20th century. Another characteristic of New Mexico's past climate are the large swings from conditions that approached the 20th century in terms of wetness to dry conditions that were far more intense and a far greater duration than any that have been experienced since the state was settled.

The paleo-climate record give us clear indication that droughts are a part of the natural climate system of New Mexico and thus should not be used as an example of events that are caused by any type of anthropogenic climate change. Instead, they have been far worse in the past, long before any possible human influences.

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WILDFIRES: There is a clear link between dry conditions and the outbreak of wildfires across the western United States, including the state of New Mexico. Figure 7 shows the co-occurrence of regional wildfire and dry conditions in the U.S. Rocky Mountains for the past several hundred years. Notice that most regional wildfire (red triangles) occur when conditions are dry (PDSI is below zero, or summer precipitation is less than normal). Most widespread wildfire outbreaks occur during times of low moisture levels.

Co-occurrence of Droughts and Wildfires in the Rocky Mountains

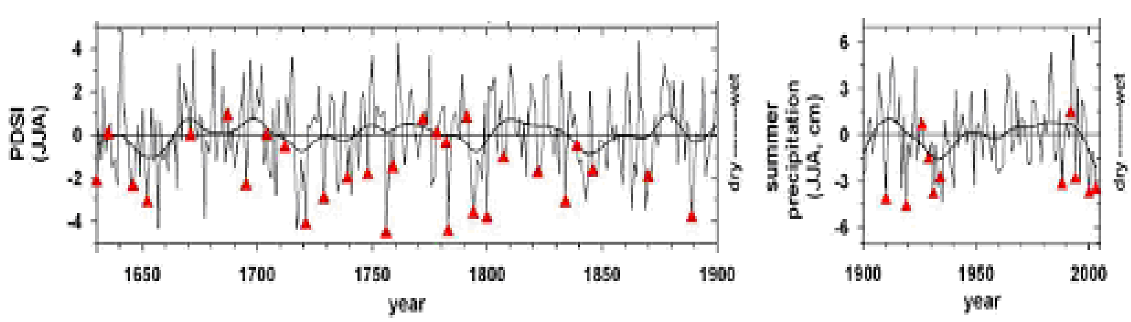

Figure 7. *Reconstructed summer Palmer Drought Severity Index during historical years (left) and regional summer precipitation during modern years (right) overlaid with the occurrence of regional wildfires (red triangles) in the Northern Rocky Mountains. (source Heyerdahl et al.)*

And, as we have seen from our review of the paleodrought history of New Mexico (Figure 6), periods of low moisture levels are not uncommon and have been occurring for more than 2000 years.

A recent study created a paleo-reconstruction of wildfires across the western U.S. during the past 550 years using data collected on fire scars on trees (Kitzberger et al., 2007). In addition to finding the expected close occurrence between wildfires and droughts, the authors also found linkages between cycles of wildfire frequency and natural cycles of regional climate variability, both over the Pacific as well as the Atlantic Ocean. These natural cycles can go along way to explaining much of the variability in wildfire outbreaks.

Throughout history, wildfire and drought have been linked together in New Mexico and the western United States. And wildfires and drought are both influenced by natural oscillations in patterns of sea surface temperature and atmospheric circulation systems in the Atlantic and Pacific Oceans. There have been times in the past that have been extensively drier have been associated with a greater frequency of wildfires than anything that we have experienced in the past 100 years, prior to any widespread human impact on the composition of the atmosphere. This demonstrates that without any human alterations, the climate can change and vary in such a manner as to make both drought and wildfire a much more common occurrence in New Mexico than it is today.

HEAT-RELATED MORTALITY: The desert Southwest has arguably the highest summer temperatures found in the United States and nevertheless has thriving populations in the midst of the heat. If heat-related mortality is to become a major concern around the country in the future if the climate warms, then it ought to already be major problem in southern New Mexico where summer temperatures are far hotter than they are ever projected to be in the rest of the country. But an examination of mortality statistics shows that incidences of mortality associated with excessive heat are rare in the desert Southwest and for the most part statistically undetectable. This is strong evidence that local populations can adapt to the prevailing climate conditions, rather than simply perishing at their hand.

In fact, a number of weather/mortality research studies clearly demonstrate that during the several decades, the population in major U.S. cities all across the country has grown better adapted, and thus less sensitive, to the effects of excessive heat events (Davis et al., 2003a, 2003b). Each of the bars in the Figure 8 represents the annual number of heat-related deaths in 28 major cities across the United States. There should be three bars for each city, representing, from left to right, the decades of the 1970s, 1980s and 1990. For nearly all cities, the number of heat-related deaths (on a per capita basis) is declining (the bars are get smaller). This adaptation is most likely a result of improvements in medical technology, access to air-conditioned homes, cars, and offices, increased public awareness of potentially dangerous weather situations, and proactive responses of municipalities during extreme weather events.

Heat-Related Mortality Trends Across the U.S.

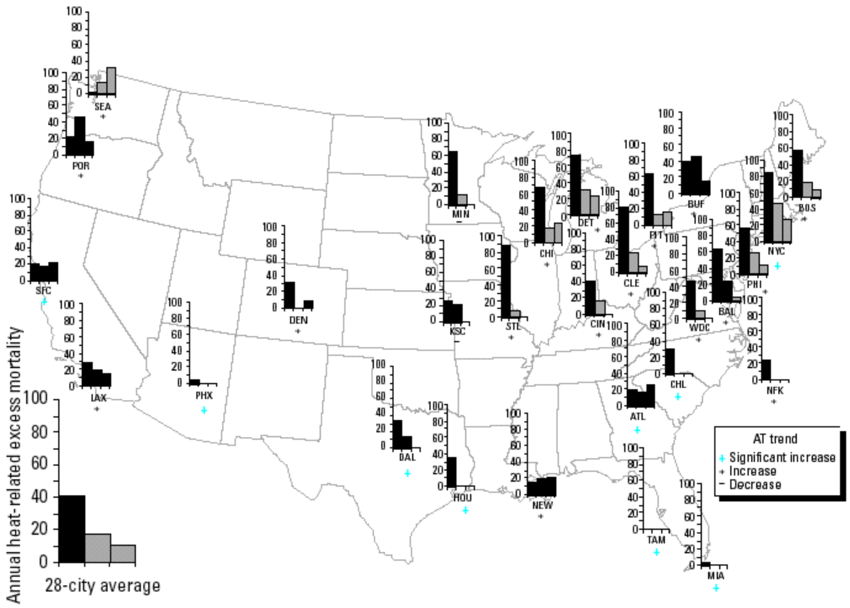

Figure 8. *Annual heat-related mortality rates (excess deaths per standard million population). Each histogram bar indicates a different decade (from left to right, 1970s, 1980s, 1990s). (Source: Davis et al., 2003b).*

The pattern of the distribution of heat-related mortality shows that in locations where extremely high temperatures are more commonplace, such as along the southern tier states, the prevalence of heat-related mortality is much lower than in the regions of the country where extremely high temperatures are somewhat rarer (e.g. the northeastern U.S.). This is especially true in the desert Southwest. For instance in Phoenix, Arizona the nearest major desert city that was part of the study, no significant relationship was found between daily mortality and daily temperatures during the summertime during the most recently studied decade. The same holds true in another nearby hot location, Dallas Texas. This provides strong demonstration that populations adapt to their prevailing climate conditions—as undoubtedly is the case for New Mexico. Contrary to pessimistic projections of increasing heat-related mortality, if temperatures warm in the future and excessive heat events become more common, there is every reason to expect that adaptations will take place to lessen their impact on the general population.

"Tropical" diseases such as malaria and dengue fever have been erroneously predicted to spread due to global warming.

Vector-Borne Diseases: "Tropical" diseases such as malaria and dengue fever have been erroneously predicted to spread due to global warming. In fact, they are related less to climate than to living conditions. These diseases are best controlled by direct application of sound, known public health policies.

Malaria Distribution in the United States

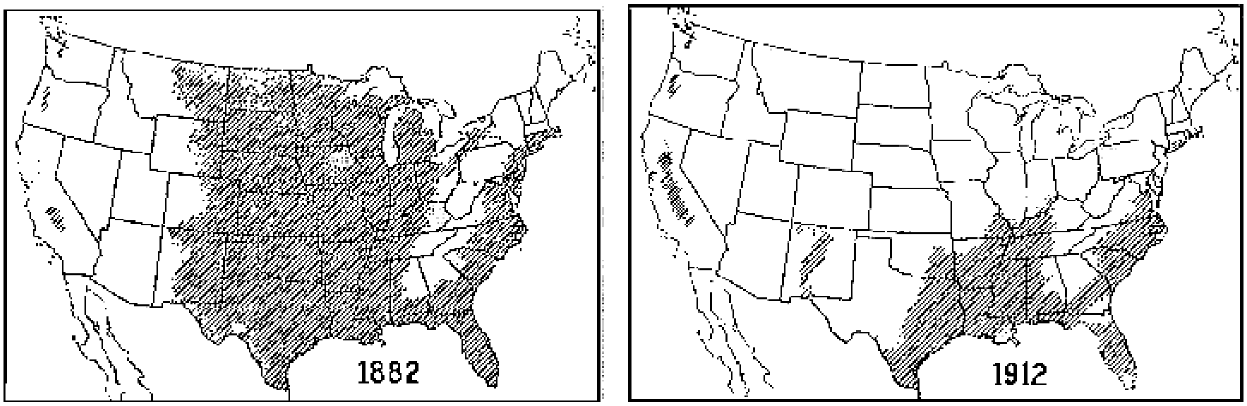

Figure 9. *Shaded regions indicate locations where malaria was endemic in the United States (source: Zucker et al., 1996).*

The two tropical diseases most commonly cited as spreading as a result of global warming, malaria and dengue fever, are not in fact "tropical" at all and thus are not as closely linked to climate as many people suggest. For example, malaria epidemics occurred as far north as Archangel, Russia, in the 1920s, and in the Netherlands. Malaria was common in most of the United States prior to the 1950s (Reiter, 1996). In fact, in the late 1800s, a period when it was demonstrably colder in the United States than it is today, malaria was endemic in most of the United States east of the Rocky Mountains (including the eastern 2/3rds of New Mexico). In 1878, about 100,000 Americans were infected with malaria; about one-quarter of them died. By 1912, malaria was already being brought under control, yet persisted in the southeastern United States well into the 1940s. In fact, in 1946 the Congress created the Communicable Disease Center (the forerunner to the current U.S. Centers for Disease Control and Prevention) for the purpose of eradicating malaria from the regions of the U.S. where it continued to persist. By the mid-to-late 1950s, the Center had achieved its goal and malaria was effectively eradicated from the United States. This occurred not because of climate change, but because of technological and medical advances. Better anti-malaria drugs, air-conditioning, the use of screen doors and windows, and the elimination of urban overpopulation brought about by the development of suburbs and automobile commuting were largely responsible for the decline in malaria (Reiter, 1996; Reiter, 2001). Today, the mosquitoes that spread malaria are still widely present in the Unites States, but the transmission cycle has been disrupted and the pathogen leading to the disease is absent. Climate change is not involved.

The effect of technology is also clear from statistics on dengue fever outbreaks, another mosquito-borne disease. In 1995, a dengue pandemic hit the Caribbean and Mexico. More than 2,000 cases were reported in the Mexican border town of Reynosa. But in the town of Hidalgo, Texas, located just across the river, there were only seven reported cases of the disease (Reiter, 1996).

Dengue Fever at the Texas/Mexico Border from 1980 to 1999

Figure 10. *Number of cases of Dengue Fever at the Texas/Mexico border from 1980 to 1999. During these 20 years, there were 64 cases reported in all of Texas, while there were nearly 1,000 times that amount in the bordering states of Mexico. (source: Reiter, 2001).*

This is just not an isolated example, for data collected over the past several decades has shown a similarly large disparity between the high number of cases of the disease in northern Mexico and the rare occurrences in the southwestern United States (Reiter, 2001). There is virtually no difference in climate between these two locations, but a world of difference in infrastructure, wealth, and technology—city layout, population density, building structure, window screens, air-conditioning and personal behavior are all factors that play a large role in the transmission rates (Reiter, 2001).

This result is confirmed by a large review of the causes of the increase in dengue fever transmission throughout the world. Wilder-Smith and Gubler (2008) reported that during the past two decades there was an unprecedented geographic expansion of dengue fever, but that "climate has rarely been the principal determinant of [dengue's] prevalence or range," and that "human activities and their impact on local ecology have generally been much more significant." They concluded that "population dynamics and viral evolution offer the most parsimonious explanation for the observed epidemic cycles of the disease, far more than climatic factors." In other words, climate and climate change, has little to do with changes in dengue fever transmission.

Another "tropical" disease that is often (falsely) linked to climate change is the West Nile Virus. The claim is often made that a warming climate is allowing the mosquitoes that carry West Nile Virus to spread into New Mexico. However, nothing could be further from the truth.

West Nile Virus was introduced to the United States through the port of New York City in the summer of 1999. Since its introduction, it has spread rapidly across the country, reaching the West Coast by 2002 and has now been documented in every state as well as most provinces of Canada. This is not a sign that the U.S. and Canada are progressively warming. Rather, it is a sign that the existing environment is naturally primed for the virus.

The vector for West Nile is mosquitoes; wherever there is a suitable host mosquito population, an outpost for West Nile virus can be established. And it is not just *one* mosquito species that is involved. Instead, the disease has been isolated in over *40 mosquito species* found throughout the United States. So the simplistic argument that climate change is allowing a West Nile carrying mosquito species to move into New Mexico is simply wrong. The already-resident mosquito populations of New Mexico are appropriate hosts for the West Nile virus—as they are in every other state.

Clearly, as is evident from the establishment of West Nile virus in every state in the contiguous U.S., climate has little, or nothing, to do with its spread. The annual average temperature from the southern part of the United States to the northern part spans a range of more than 40ºF, so clearly the virus exists in vastly different climates. In fact, West Nile virus was introduced in New York City—hardly the warmest portion of the country—and has spread westward and southward into both warmer and colder and wetter and drier climates. This didn't happen because climate changes allowed its spread, but because the virus was introduced to a place that was ripe for its existence—basically any location with a resident mosquito population (which describes basically anywhere in the U.S).

Another "tropical" disease that is often (falsely) linked to climate change is the West Nile Virus.

Spread of the West Nile Virus across the United States After its Introduction in New York City in 1999

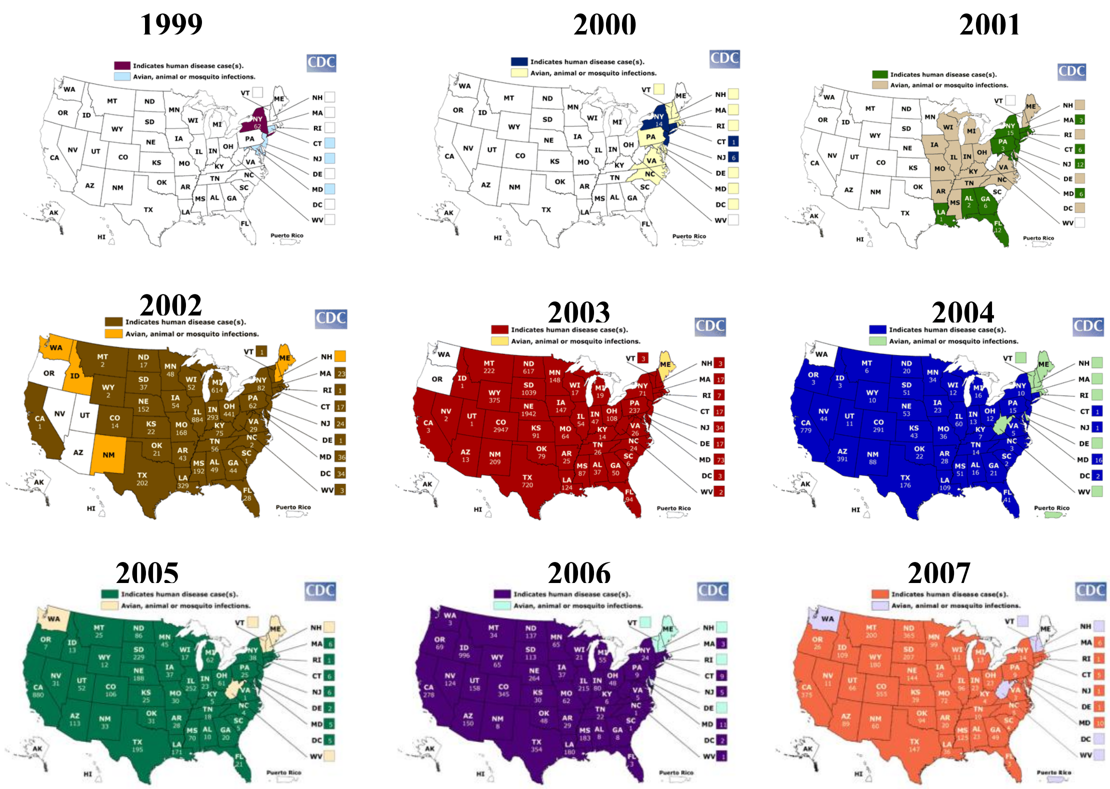

Figure 11. *Spread of the occurrence of the West Nile Virus from its introduction to the United States in 1999 through 2007. By 2003, virtually every state in the country had reported the presence of virus. (source: http://www.cdc.gov/ncidod/dvbid/westnile/Mapsactivity/surv&control07Maps.htm).*

West Nile virus now exists in New Mexico because the extant climate/ecology of New Mexico is one in which the virus can thrive. The reason that it was not found in the past was simply because it had not been introduced. Climate change in New Mexico has absolutely nothing to do with it. By following the virus' progression from 1999 through 2007, one clearly sees that the virus spread from New York City southward and westward, it did not invade slowly from the (warmer) south, as one would have expected if warmer temperatures was the driver.

Since the disease spreads in a wide range of both temperature and climatic regimes, one could raise or lower the average annual temperature in New Mexico by many degrees or vastly change the precipitation regime and not make a bit of difference in the aggression of the West Nile Virus. Science-challenged claims to the contrary are not only ignorant but also dangerous, serving to distract from real epidemiological diagnosis which allows health officials critical information for protecting the citizens of New Mexico.

IMPACTS OF CLIMATE-MITIGATION MEASURES IN NEW MEXICO

Globally, in 2008, humankind emitted 30,493 million metric tons of carbon dioxide (mmtCO_2: EIA, 2011a), of which emissions from New Mexico accounted for 57.6 mmtCO_2, or only 0.19% (EIA, 2011b). The proportion of manmade CO_2 emissions from New Mexico will decrease over the 21st century as the rapid demand for power in developing countries such as China and India outpaces the growth of New Mexico's CO_2 emissions (EIA, 2011b).

During the past 10 years, global emissions of CO_2 from human activity have increased at an average rate of 2.9%/yr (EIA, 20011a), meaning that the annual *increase* of anthropogenic global CO_2 emissions is about 15 times greater than New Mexico's *total* emissions. This means that even a complete cessation of *all* CO_2 emissions in New Mexico will be completely subsumed by global emissions growth in less than one month's time! In fact, China alone adds about 8 New Mexico's-worth of *new* emissions to its emissions' total *each and every year*. Clearly, given the magnitude of the global emissions and global emission growth, regulations prescribing a *reduction*, rather than a complete cessation, of New Mexico's CO_2 emissions will have absolutely no effect on global climate.

The annual increase of anthropogenic global CO_2 emissions is about 15 times greater than New Mexico's total emissions.

Wigley (1998) examined the climate impact of adherence to the emissions controls agreed under the Kyoto Protocol by participating nations, and found that, if all developed countries meet their commitments in 2010 and maintain them through 2100, with a mid-range sensitivity of surface temperature to changes in CO_2, the amount of warming "saved" by the Kyoto Protocol would be 0.07°C by 2050 and 0.15°C by 2100. The global sea level rise "saved" would be 2.6 cm, or one inch. A complete cessation of CO_2 emissions in New Mexico is only a tiny fraction of the worldwide reductions assumed in Dr. Wigley's global analysis, so its impact on future trends in global temperature and sea level will be only a minuscule fraction of the negligible effects calculated by Dr. Wigley.

We now apply Dr. Wigley's results to CO_2 emissions in New Mexico, assuming that the ratio of U.S. CO_2 emissions to those of the developed countries which have agreed to limits under the Kyoto Protocol remains constant at 39% throughout the 21st century. We also assume that developing countries such as China and India continue to emit at an increasing rate. Consequently, the annual proportion of global CO_2 emissions from human activity that is contributed by human activity in the United States will decline. Finally, we assume that the *proportion* of total U.S. CO_2 emissions in New Mexico – now 1.00% – remains constant throughout the 21st century. With these assumptions, we generate the following table derived from Wigley's (1998) mid-range emissions scenario (which itself is based upon the IPCC's scenario "IS92a"):

Table 1
Projected Annual CO_2 Emissions ($mmtCO_2$)

Year	Global Emissions: *Wigley, 1998*	Developed Countries: *Wigley, 1998*	U.S. (39% of developed countries)	New Mexico (1.0% of U.S.)
2000	26,609	14,934	5,795	58
2025	41,276	18,308	7,103	71
2050	50,809	18,308	7,103	71
2100	75,376	21,534	8,355	84

Note: *Developed countries' emissions, according to Wigley's assumptions, do not change between 2025 and 2050: neither does total U.S or New Mexico emissions.*

In Table 2, we compare the total CO_2 emissions saving that would result if New Mexico's CO_2 emissions were completely halted by 2025 with the emissions savings assumed by Wigley (1998) if all nations met their Kyoto commitments by 2010, and then held their emissions constant throughout the rest of the century. This scenario is "Kyoto Const."

Table 2
Projected Annual CO_2 Emissions Savings ($mmtCO_2$)

Year	New Mexico	Kyoto Const.
2000	0	0
2025	71	4,697
2050	71	4,697
2100	84	7,924

Table 3 shows the proportion of the total emissions reductions in Wigley's (1998) case that would be contributed by a complete halt of all New Mexico's CO_2 emissions (calculated as column 2 in Table 2 divided by column 3 in Table 2).

Table 3
New Mexico's Percentage of Emissions Savings

Year	New Mexico
2000	0.0%
2025	1.5%
2050	1.5%
2100	1.1%

Using the percentages in Table 3, and assuming that temperature change scales in proportion to CO_2 emissions, we calculate the global temperature savings that will result from the complete cessation of anthropogenic CO_2 emissions in New Mexico:

Table 4
Projected Global Temperature Savings (ºC)

Year	Kyoto Const.	New Mexico
2000	0	0
2025	0.03	0.0005
2050	0.07	0.001
2100	0.15	0.002

Accordingly, a cessation of all of New Mexico's CO_2 emissions would result in a climatically-irrelevant global temperature reduction by the year 2100 of about two *thousandths* of a degree Celsius. Results for sea-level rise are also negligible:

Table 5
Projected Global Sea-Level Rise Savings (cm)

Year	Kyoto Const.	New Mexico
2000	0	0
2025	0.2	0.003
2050	0.9	0.01
2100	2.6	0.03

A complete cessation of all anthropogenic emissions from New Mexico will result in a global sea-level rise savings by the year 2100 of an estimated 0.03 cm, or one *hundredths* of an inch. Again, this value is climatically irrelevant.

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Extending the Emissions Analysis to All 50 States

Following a similar procedure (as outline above), these results can be extended to all 50 states and to the U.S. as a whole. The results of such an extension are presented in Table 6.

In perusing the contents of Table 6, several key points, become immediately identifiable:

- If the U.S. as a whole stopped emitting all carbon dioxide (CO_2) emissions immediately, the ultimate impact on projected global temperature rise would be a reduction, or a "savings", of approximately 0.11°C by the year 2050 and 0.16°C by the year 2100—amounts that are, for all intents and purposes, negligible.

- The impact of a complete and immediate cessation of all CO_2 emissions from the U.S. on projections of future sea level rise would be similarly small—a reduction of the projected sea level rise of only 1.4cm by 2050 and 2.7cm (slightly more than one inch) by the year 2100.

- The current growth rate in CO_2 emissions from other countries of the world will quickly subsume any reductions in U.S. CO_2 emissions. Based on trends in CO_2 emissions growth over the past decade, global growth will completely replace any elimination of all CO_2 emissions from the U.S. in just *7 years*, while *growth* in emissions from China alone will replace an elimination of all U.S. emissions in just 12 years. Subsuming a reduction (rather than a complete cessation) of U.S. emissions will occur even more quickly.

- As the CO_2 emissions from individual states are considerably less than the U.S. total, so too are the potential "savings" of global warming and sea level rise that any individual state can expect through reducing or even completely eliminating all CO_2 emissions originating from within its borders.

If the U.S. as a whole stopped emitting all carbon dioxide (CO_2) emissions immediately, the ultimate impact on projected global temperature rise would be a reduction, or a "savings", of approximately 0.11°C by the year 2050 and 0.16°C by the year 2100—amounts that are, for all intents and purposes, negligible.

Table 6
Analysis of Carbon Dioxide Emissions (for 2008) and Potential "Savings" in Future Global Temperature and Global Sea Level Rise

State	2008 Emissions (million metric tons CO_2)	Percentage of Global Total	Time until Total Emissions Cessation Subsumed by Foreign Growth (days)		Temperature "Savings" (ºC)		Sea Level "Savings" (cm)	
			Global Growth	China Growth	2050	2100	2050	2100
AK	39.4	0.13	17	31	0.0007	0.0011	0.0092	0.0186
AL	139.1	0.46	59	108	0.0025	0.0038	0.0326	0.0656
AR	64.8	0.21	28	50	0.0012	0.0018	0.0152	0.0305
AZ	103.0	0.34	44	80	0.0019	0.0028	0.0241	0.0486
CA	392.3	1.29	167	304	0.0071	0.0107	0.0918	0.1850
CO	97.5	0.32	42	76	0.0018	0.0027	0.0228	0.0460
CT	38.1	0.13	16	30	0.0007	0.0010	0.0089	0.0180
DC	2.3	0.01	1	2	0.0000	0.0001	0.0005	0.0011
DE	16.4	0.05	7	13	0.0003	0.0004	0.0038	0.0077
FL	240.4	0.79	102	186	0.0044	0.0065	0.0563	0.1133
GA	174.4	0.58	74	135	0.0032	0.0047	0.0408	0.0822
HI	19.7	0.06	8	15	0.0004	0.0005	0.0046	0.0093
IA	88.1	0.29	38	68	0.0016	0.0024	0.0206	0.0415
ID	15.6	0.05	7	12	0.0003	0.0004	0.0037	0.0074
IL	241.7	0.80	103	187	0.0044	0.0066	0.0566	0.1140
IN	232.0	0.77	99	180	0.0042	0.0063	0.0543	0.1094
KS	77.3	0.26	33	60	0.0014	0.0021	0.0181	0.0364
KY	154.9	0.51	66	120	0.0028	0.0042	0.0363	0.0730
LA	174.8	0.58	74	135	0.0032	0.0048	0.0409	0.0824
MA	75.5	0.25	32	58	0.0014	0.0021	0.0177	0.0356
MD	74.4	0.25	32	58	0.0014	0.0020	0.0174	0.0351
ME	18.8	0.06	8	15	0.0003	0.0005	0.0044	0.0089
MI	176.2	0.58	75	136	0.0032	0.0048	0.0412	0.0831
MN	103.8	0.34	44	80	0.0019	0.0028	0.0243	0.0489
MO	137.8	0.45	59	107	0.0025	0.0037	0.0323	0.0650
MS	63.7	0.21	27	49	0.0012	0.0017	0.0149	0.0300
MT	36.0	0.12	15	28	0.0007	0.0010	0.0084	0.0170
NC	150.1	0.50	64	116	0.0027	0.0041	0.0351	0.0707
ND	53.0	0.17	23	41	0.0010	0.0014	0.0124	0.0250
NE	46.2	0.15	20	36	0.0008	0.0013	0.0108	0.0218
NH	18.9	0.06	8	15	0.0003	0.0005	0.0044	0.0089
NJ	127.8	0.42	54	99	0.0023	0.0035	0.0299	0.0603
NM	**57.6**	**0.19**	**25**	**45**	**0.0010**	**0.0016**	**0.0135**	**0.0272**
NV	41.0	0.14	17	32	0.0007	0.0011	0.0096	0.0193
NY	190.9	0.63	81	148	0.0035	0.0052	0.0447	0.0900
OH	262.3	0.87	112	203	0.0048	0.0071	0.0614	0.1237
OK	112.1	0.37	48	87	0.0020	0.0030	0.0262	0.0528
OR	43.0	0.14	18	33	0.0008	0.0012	0.0101	0.0203
PA	265.1	0.87	113	205	0.0048	0.0072	0.0620	0.1250
RI	10.7	0.04	5	8	0.0002	0.0003	0.0025	0.0050
SC	86.0	0.28	37	67	0.0016	0.0023	0.0201	0.0406
SD	14.9	0.05	6	12	0.0003	0.0004	0.0035	0.0070
TN	120.1	0.40	51	93	0.0022	0.0033	0.0281	0.0566
TX	622.7	2.05	265	482	0.0113	0.0169	0.1458	0.2936
UT	69.9	0.23	30	54	0.0013	0.0019	0.0164	0.0329
VA	118.4	0.39	50	92	0.0022	0.0032	0.0277	0.0558
VT	6.1	0.02	3	5	0.0001	0.0002	0.0014	0.0029
WA	79.4	0.26	34	62	0.0014	0.0022	0.0186	0.0375
WI	105.9	0.35	45	82	0.0019	0.0029	0.0248	0.0499
WV	112.9	0.37	48	87	0.0021	0.0031	0.0264	0.0532
WY	66.9	0.22	28	52	0.0012	0.0018	0.0157	0.0315
U.S. Total	**5,814.4**	**19.18**	**2476.58 (6.8 yrs)**	**4502.53 (12.3 yrs)**	**0.1059**	**0.1582**	**1.3610**	**2.7414**

COSTS OF FEDERAL LEGISLATION

And what would be the potential costs to New Mexico of federal actions designed to cap greenhouse gas emissions? A comprehensive analysis was recently completed by the National Association of Manufacturers (NAM) and the American Council for Capital Formation (ACCF) examining the economic impact of The American Clean Energy and Security Act of 2009, also known as the Waxman-Markey Bill (HR 2454). The NAM/ACCF commissioned the Science Applications International Corporation (SAIC) to assess the impact of the Waxman-Markey Bill on manufacturing, jobs, energy prices and the overall economy. The NAM/ACCF study accounts for all federal energy laws and regulations currently in effect. It accounts for increased access to oil and natural gas supplies, new and extended tax credits for renewable generation technologies, increased World Oil Price profile, as well as permit allocations for industry and international offsets. Additionally, the provisions of the stimulus package passed in February 2009 are included in the study.

For a complete description of these findings please visit: http://www.accf.org/publications/126/accf-nam-study.

In general, for the U.S., the NAM/ACCF found:

- Cumulative Loss in Gross Domestic Product (GDP) up to $3.1 trillion (2012-2030)
- Employment losses up to 2.4 million jobs in 2030
- Residential electricity price increases up to 50 percent by 2030
- Gasoline price increases (per gallon) up 26 percent by 2030.

The NAM.ACCF also analyzed the economic costs on a state by state basis. For New Mexico, in particular, they found that by the year 2020, average annual household disposable income would decline by $70 to $166 and by the year 2030 the decline would increase to between $409 and $755. The state would stand to lose between 9,300 and 12,700 jobs by 2030. At the same time energy price would rise substantially. Gas prices could increase by 27%, electricity prices by 61% and natural gas by up to 78%. New Mexico's Gross Domestic Product could decline by 2030 by as much as $4.6 billion/yr.

And all this economic hardship—in the midst of a recession—would come with absolutely no detectable impact on the course of future climate. This is the epitome of a scenario of all pain and no gain.

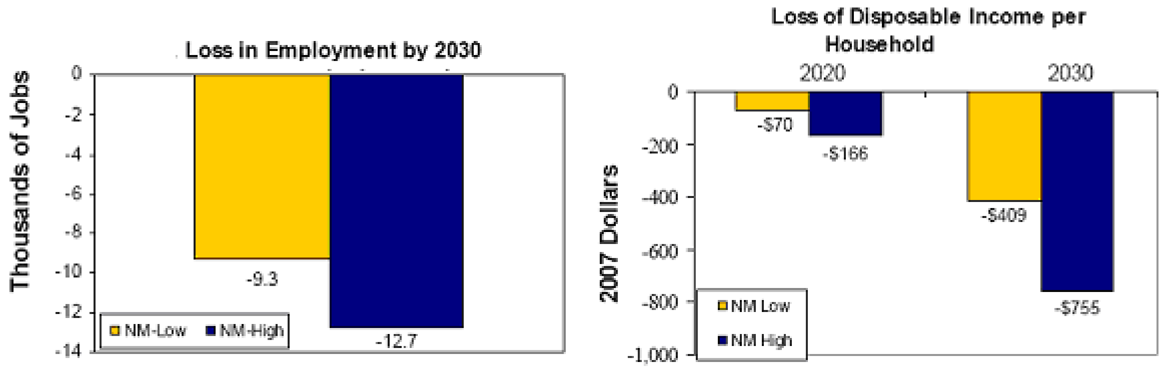

***Figure 12**. Examples of the economic impacts in New Mexico of federal legislation to limit greenhouse gas emissions green. (Source: National Association of Manufacturers, 2009; http://www.accf.org/media/docs/nam/2009/NewMexico.pdf)*

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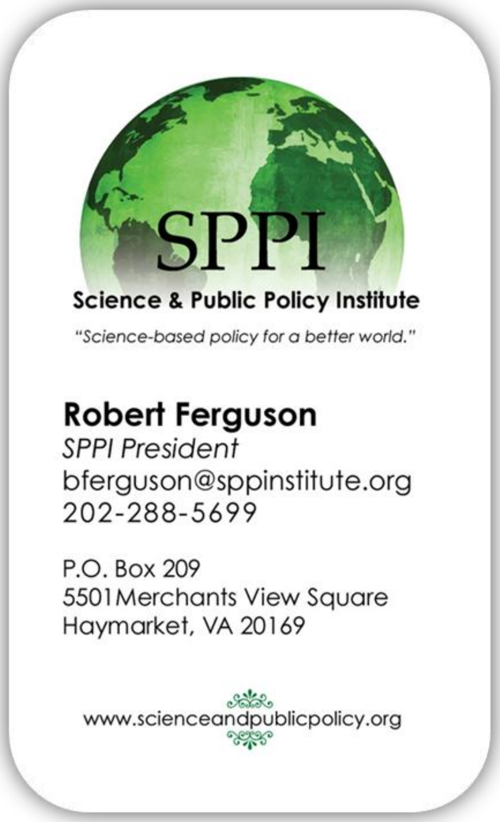
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