# Sierra Club Three Lakes Group
# Spring 2013 Newsletter

**Three Lakes Group Officers:** Roger Blanchard, Chair; Annemarie Askwith, Treasurer; Cathy Akre, Secretary; Carol Ward, Forestry; Diane Meyer, Conservation Chair.

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## Spring Program Schedule

Spring programs will be held at Bayliss Public Library in Sault Ste. Marie. Cookies and drinks will be supplied at the programs.

**Thursday February 14, 6:30 pm: The Arctic National Wildlife Refuge -- The Issues and the Place-**Beth Hronek will present pictures and stories from her two trips to ANWR. See scenery from the southern edge of ANWR, taken while on a canoe trip down the Porcupine River. From the North Slope, see images from a rafting trip down the Kongakut River.

Roger Blanchard will talk about oil and ANWR.

**Thursday March 28, 7:00 pm (The later time is to accommodate a library board meeting), This program will be announced later.**

**Thursday April 11, 6:30 pm, Gasoline Prices, Oil Supplies, Bakken, Eagle Ford and So Much More-** Roger Blanchard will talk about the current status of U.S., Bakken and Eagle Ford oil production and the reasons that gasoline prices remain stubbornly high.

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## Sault Ste. Marie Sets High Annual Temperature Record in 2012

Sault Ste. Marie, MI set an annual high temperature record in 2012 at 45.71 F. The previous record was set in 1998 at 45.52 F. The 1998 record was set in a year with a record El Nino whereas 2012 was not an El Nino year. Two of the three warmest years on record in Sault Ste. Marie have been set in the last 3 years, 2012 at number 1 and 2010 at number 3. The year 2011 was also the 10th warmest year on record in Sault Ste. Marie. Below are tables with temperature data for Sault Ste. Marie.

**Average Temperature per Decade**

| Decade | Average Temperature (°F) |
|---|---|
| 1890s | 39.5 |
| 1900s | 39.9 |
| 1910s | 39.4 |
| 1920s | 39.6 |
| 1930s | 40.8 |
| 1940s | 40.4 |
| 1950s | 40.2 |
| 1960s | 39.9 |
| 1970s | 39.8 |
| 1980s | 40.2 |
| 1990s | 40.8 |
| 2000s | 42.1 |
| 2010-2012 | 44.6 |

**Table I**

**The 10 Coldest/Warmest Years in Sault Ste. Marie[a]**

| Coldest | | | Warmest | |
|---|---|---|---|---|
| Order | Year | Temperature (°F) | Year | Temperature (°F) |
| 1 | 1917 | 35.34 | 2012 | 45.71 |
| 2 | 1904 | 36.65 | 1998 | 45.52 |
| 3 | 1907 | 37.02 | 2010 | 44.77 |
| 4 | 1926 | 37.25 | 1931 | 44.28 |
| 5 | 1893 | 37.55 | 2006 | 43.82 |
| 6 | 1912 | 37.57 | 2001 | 43.77 |
| 7 | 1950 | 37.64 | 1921 | 43.50 |
| 8 | 1924 | 38.02 | 1987 | 43.48 |
| 9 | 1982 | 38.08 | 2000 | 43.28 |
| 10 | 1943 | 38.42 | 2011 | 42.98 |

**Table II**

**Roger**

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# Temperature Changes in Northern North America

Below is a table with temperature data for a variety of location throughout northern North America. It was another warm year in the north.

**Average Temperature for Time Frame (°F)**

| City/Town | 1970-1979 | 1980-1989 | 1990-1999 | 2000-2009 | 2010-2012 | Change 1970s to 2010-2012 |
|---|---|---|---|---|---|---|
| Sault Ste. Marie, MI | 39.8 | 40.0 | 40.8 | 42.1 | 44.6 | +4.8 |
| Eureka, Nunavut | -4.9 | -3.7 | -1.8 | -04 | 1.7 | +6.6 |
| Cambridge Bay, Nunavut | 4.9 | 5.9 | 7.1 | 7.4 | 10.8 | +5.9 |
| Coral Harbor, Nunuvut | 10.6 | 11.3 | 11.3[b] | 13.4 | 15.9 | +5.3 |
| Yellowknife, NWT | 23.0 | 23.5 | a | 24.6 | 27.1 | +4.1 |
| Goose Bay, Newfoundland | 30.7 | 31.3 | 31.0 | 33.2 | 35.8 | +5.1 |
| Stephensville, Newfoundland | 39.9 | 40.6 | 40.1 | 41.8 | 44.1 | +4.2 |
| North Bay, Ontario | 38.0 | 38.6 | 39.5 | 40.1 | 42.6 | +4.6 |
| Sioux Lookout, Ontario | 33.6 | 35.2 | 35.5 | 36.1 | 38.8 | +5.2 |
| Windsor, Ontario | 48.3 | 48.9 | 49.7 | 50.4 | 51.9 | +3.6 |
| Montreal, Quebec | 42.4 | 43.1 | 44.0 | 44.7 | 46.9 | +4.5 |
| Thompson, Manitoba | 25.5 | 26.4 | a | 27.7 | 29.7 | +4.2 |
| Churchill, Manitoba | 18.9 | 19.6 | 20.1 | 21.1 | 24.0[d] | +5.1 |
| Terrace, British Columbia | 42.1 | 43.9 | 44.0 | 43.7 | 43.3 | +1.2 |
| Kamloops, British Columbia | 46.9 | 48.2 | 48.7 | 49.0 | 49.5 | +2.6 |
| High Level, Alberta | 29.3[c] | 29.6 | 30.2 | 30.6 | 31.0 | +2.6 |
| Red Deer, Alberta | 35.1 | 37.0 | 36.1 | 37.0 | 37.0 | +1.9 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Grande Prairre, Alberta | 34.4 | 36.3 | 35.6 | 36.0 | 35.2 | +0.8 |
| La Ronge, Saskatchewan | 30.6 | 32.7 | 32.4 | 32.6 | 34.3 | +3.7 |
| Estevan, Saskatchewan | 37.9 | 40.1 | 38.2 | 38.1 | 39.5 | +1.6 |
| Average | 30.4 | 31.4 | - | 32.5 | 34.2 | +3.8 |

Data is from Environment Canada except for Sault Ste. Marie, MI, which is from the Weather Underground

[a]Incomplete data [b]Missing 1995 data [c]Missing 1970 data

[d]Due to data problems at Environment Canada in Nov/Dec 2010, data from the Weather Channel was used for Churchill, Manitoba for that period. For Sept/Oct 2010, the Weather Channel data averaged 0.3ºF higher than that of Environment Canada so 0.3ºF was subtracted from the Weather Channel average data values for Nov/Dec in calculating the 2010 annual average for Churchill.

**Roger**

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## Recent Commentary

Below is a recent commentary I had in the Association for the Study of Peak Oil-USA (ASPO-USA) newsletter and in the Energy Bulletin.

# A Closer Look at Bakken and U.S. Oil Production

### By Roger D. Blanchard

Recent U.S. news reports have highlighted the fact that U.S. oil production has been rising and is now higher than it has been in years. Reports that highlight the recent U.S. oil production increase don't mention that oil production outside of Texas and North Dakota has actually declined in the last few years.

Occasionally the media highlight the production increases that have occurred in the Bakken Shale region of North Dakota without going into any detail so it's worthwhile to take a closer look at the Bakken region to see what's happening.

Figure 1 is a map showing the location and extent of the Bakken Shale formation.

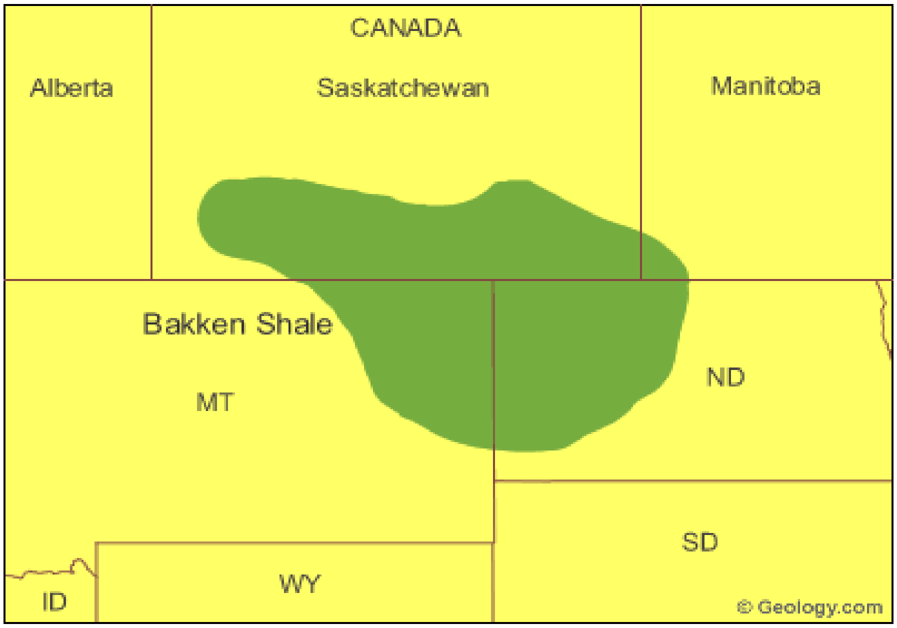


**Figure 1 – A Map of the Bakken Shale Region**

Bakken extends over a large area of North Dakota, Montana and Saskatchewan so one might think that if oil production is rising rapidly in North Dakota, it must also be rising rapidly in Montana and Saskatchewan.

Figure 2 is a graph of Montana's oil production rate in recent years. Production reached a high of ~100,000 b/d in 2006 and has since declined to ~65,000 b/d.

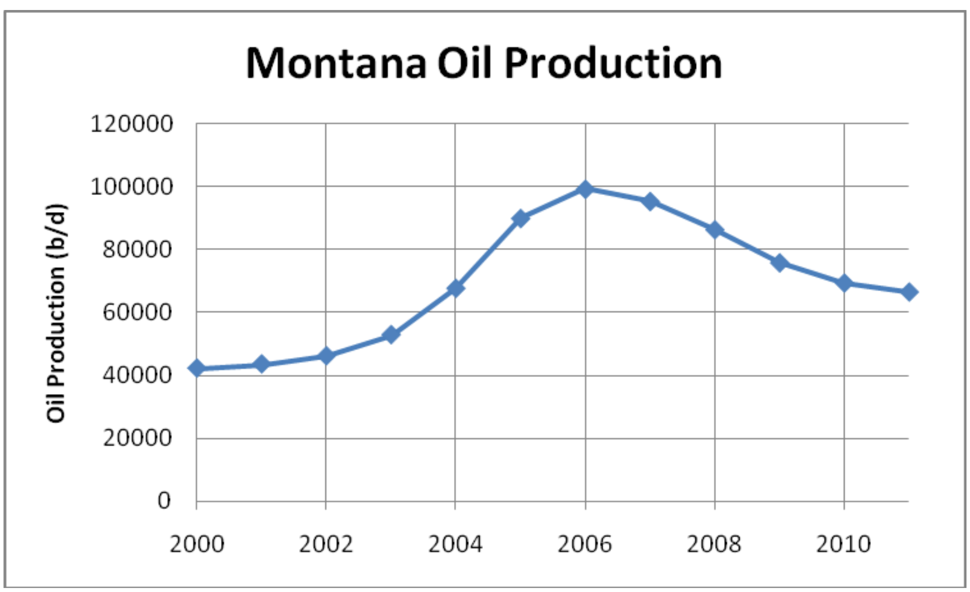


**Figure 2 – Montana Oil Production**

I read occasional articles in the Bakken Weekly suggesting that there is considerable oil activity on the Montana side of the border in the Bakken region. That activity has not translated into increasing oil production in recent years.

In the case of Saskatchewan, oil production did increase 2.2% in 2011 but that occurred after essentially flat production from 2000 to 2010 so there has not been an oil production surge in Saskatchewan like there has been in North Dakota.

Oil production in the North Dakota sector of the Bakken formation has increased rapidly, illustrated in Figure 3.

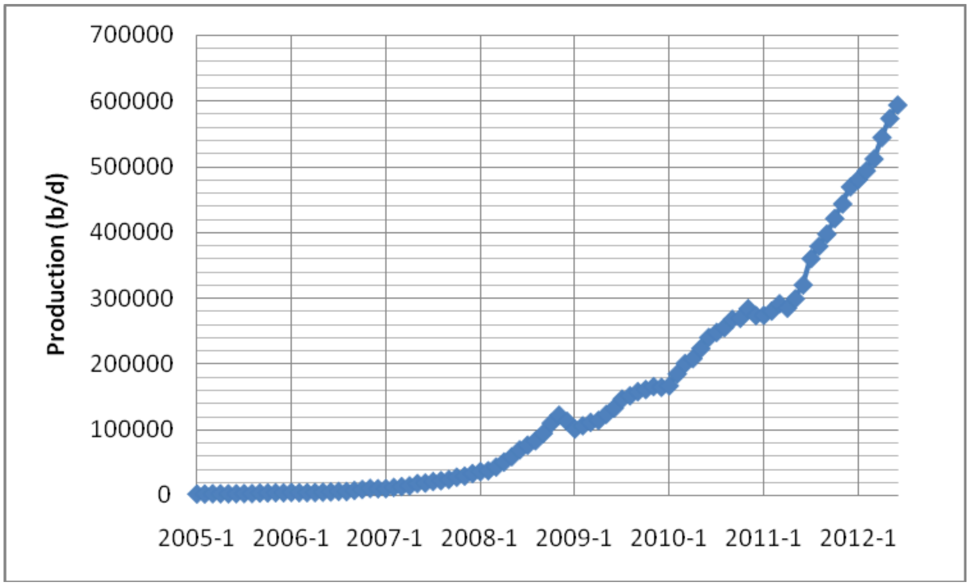


**Figure 3-Bakken Oil Production in North Dakota**

Although oil production in the Bakken region of North Dakota is growing rapidly, production is not growing uniformly throughout this region. Production is heavily concentrated in 4 counties: Williams, Mountrail, McKenzie and Dunn. Figure 4 is a map of North Dakota showing the location of the 4 counties on the western side of the state.

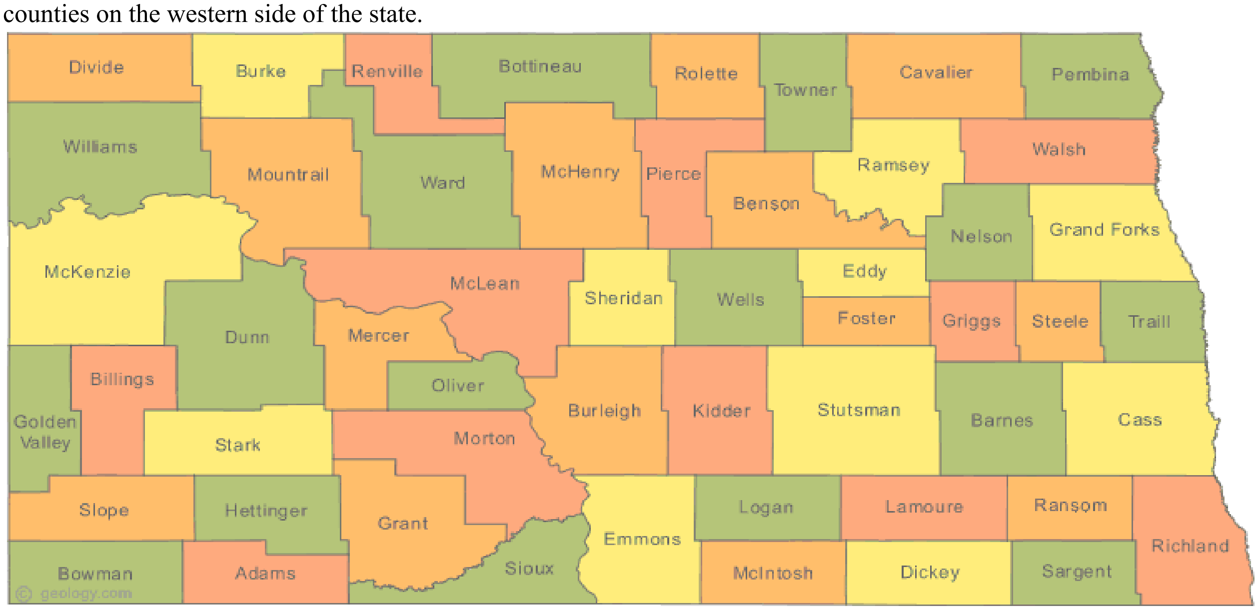


**Figure 4-County Map of North Dakota**

For the month of June 2012, the four counties had production of:

1). Mountrail – 4,882,352 barrels
2). McKenzie – 3,817,698 barrels
3). Williams – 2,970,930 barrels
4). Dunn – 2,734,640 barrels

Total production for the four counties was 14,405,620 barrels while total Bakken production was 17,830,456 barrels. The four counties represented 80.8% of total Bakken oil production. The four counties also produced 72.7% of total North Dakota oil production.

I have a contact in southern Billings County. According to that contact, oil companies have largely moved out of Billings County and moved north to the four counties specified above because that is where the oil is.

The Bakken Weekly has drilling permit data which shows that most new drilling permits are for the four counties as well. It's standard procedure for the oil industry to produce in the most favorable area of a region first before going to subprime areas and that's what the oil industry is doing in western North Dakota.

To achieve the rapidly increasing oil production in the region, oil companies have rapidly increased the rate of drilling, illustrated in Figure 5. The number of producing wells has now surpassed 4000 and the number of new well completions in 2012 should exceed 1000.

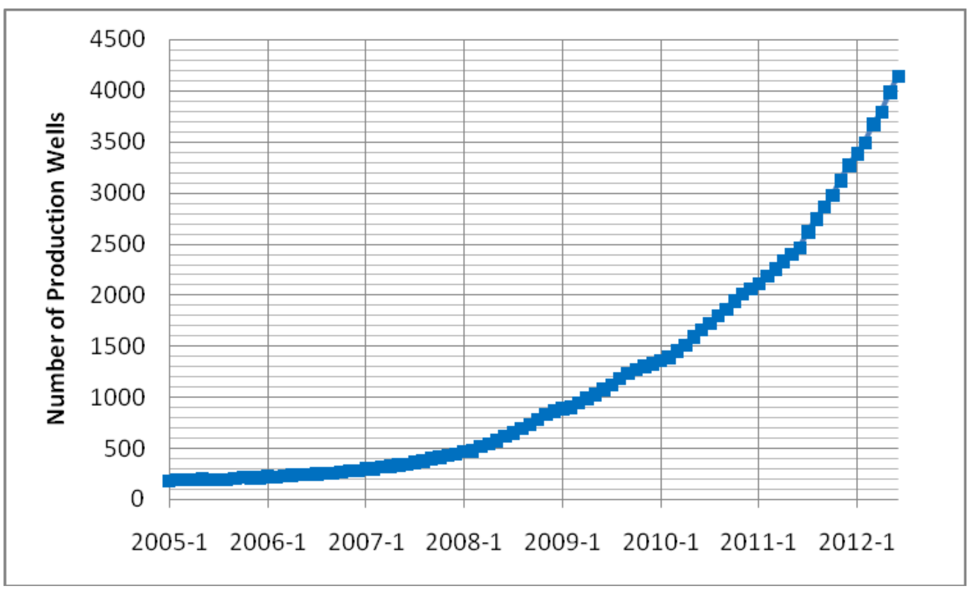


**Figure 5 – The Number of Oil Producing Wells in the Bakken Region of North Dakota**

Even within the four counties specified above, some of the area is not exceedingly fruitful. It appears to me that in the near future, the prime producing area within the four counties is going to be saturated with oil wells considering that the fracking wells being used can extend up to approximately 2 miles. Assuming that the industry continues to add new wells rapidly, they will have to go to less fruitful areas outside of the prime producing area.

Oil wells in the Bakken region decline rapidly. From data I've seen, the average decline in the first year is ~60%. The only way to maintain or increase Bakken oil production is to rapidly increase the number of wells. As the industry has to drill in less fruitful areas, being able to maintain production will become an increasing challenge.

In a previously published commentary, I stated that I expected Bakken oil production to peak around 2014. I maintain that position with my predicted peak date being 2014 +/- 1 year.

North Dakota's oil production outside of the Bakken region is already declining, illustrated in Table I.

| **Year** | **North Dakota Oil Production Outside of the Bakken Region (b/d)** |
|---|---|
| 2006 | 103,110 |
| 2007 | 103,157 |
| 2008 | 97,227 |
| 2009 | 82,058 |
| 2010 | 74,145 |
| 2011 | 66,380 |
| 2012* | 65,301 |

**Table I – North Dakota Oil Production Outside of the Bakken Region**

*Based upon data for the first 6 months of 2012

When oil production in the Bakken region starts declining, North Dakota's oil production will decline with a decline curve that pretty much parallels that of the Bakken region.

As I've stated above, the increase in U.S. oil production has been due to production increases in Texas and North Dakota. Table II contains U.S. oil production data excluding Texas and North Dakota.

| **U.S Oil Production minus Texas and North Dakota** | | |
|---|---|---|
| **Year** | **Using U.S. DOE/EIA data for the GOM** | **Using BOEM data for the GOM (mb/d)** |
| 2006 | 3.905 | 3.905 |
| 2007 | 3.881 | 3.881 |
| 2008 | 3.719 | 3.723 |
| 2009 | 4.042 | 4.042 |
| 2010 | 3.998 | 3.988 |
| 2011 | 3.787 | 3.788 |
| 2012* | 3.789 | 3.713 |

**Table II**

*Based upon data for the first 6 month of 2012

In Table II, I've included data for the Gulf of Mexico (GOM) from both the U.S. DOE/EIA and the Bureau of Ocean Energy Management (BOEM). I've done that because the near-term data from the two agencies are considerably different with the U.S. DOE/EIA data being higher.

In 2011, there was a large volume difference in data from the two agencies at the end of the year for the GOM. It appears that the two agencies met and agreed upon a production rate for the GOM in 2011 with the U.S. DOE/EIA going down and the BOEM going up. That may be the case in 2012 as well.

In Table II, the higher U.S. oil production rate outside of Texas and North Dakota in 2009-2010 was due to higher production from the deepwater GOM in those years. Since then, GOM oil production has declined leading to a decline in U.S. oil production outside of Texas and North Dakota.

According to the Annual Energy Outlook 2011 from the U.S. DOE/EIA, GOM oil production is going to increase through 2013. I personally expect GOM oil production to decline through 2013 because the only significant GOM oil complex brought on-line in 2012, Caesar/Tonga, was brought on-line in March 2012. The bulk of the production increase associated with Caesar/Tonga will be in the first half of 2012.

No new significant fields beyond Caesar/Tonga are expected to be brought on-line in the GOM through 2013 while deepwater GOM fields in decline are probably declining at an average rate of 10-20%/year, based upon my experience. Maybe the U.S. DOE/EIA knows something I don't know but it won't take long to determine if that is the case.

Without going into detail concerning Texas, I expect Texas oil production to have a secondary peak around 2014 (Texas oil production actually peaked in 1972 at 3.57 mb/d while it's presently ~1.5 mb/d). If oil production in both Texas and North Dakota begins to decline around 2015, I expect U.S. oil production as a whole to begin to decline in that same time frame.

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## And Up It Goes

In early December it was reported in the media that preliminarily $CO_2$ emissions for 2012 will be up about 2.6%. That follows increases of ~5.8% in 2010 and ~2.9% in 2011. Figure 1 is a graph of global $CO_2$ emissions since 1900.

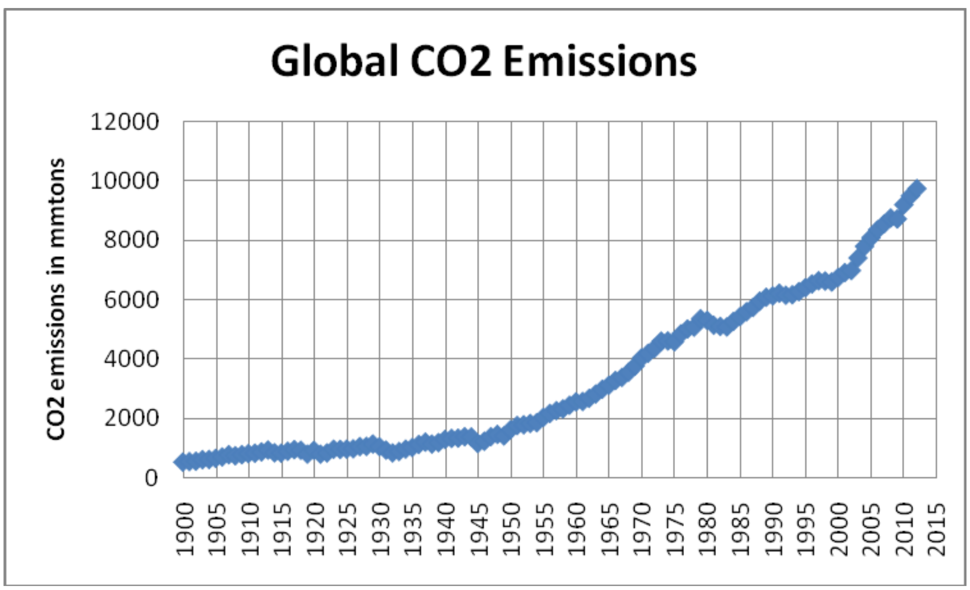


**Figure 1: $CO_2$ emissions from 1900 to 2012**

Emissions in 2012 were ~18.2 times higher than that of 1900 and about 59% higher than in 1990.

The rapid rise in global $CO_2$ emissions in recent years is largely due to rapidly increasing emissions from China and India. There have been relatively minor emission declines in Europe and the U.S. but those emission declines have been overwhelmed by increasing emissions from China and India.

The emission declines in the U.S. can be attributed to a number of factors:
1). A significant transfer of manufacturing to other countries, particularly China
2). Economic problems in the U.S. that have reduced fossil fuel consumption
3). The increased cost of oil and oil distillates that have caused motor vehicle miles driven to go down

and force a shift to more efficient vehicles
4). Very mild winters in recent years that have reduced heating needs

In the case of the U.S., if we were seriously going to stop global warming beyond what we've already committed ourselves to we would have to reduce our $CO_2$ emissions on the order of 90%. Other countries that consume considerable fossil fuels would have to undergo similar reductions. I see no realistic possibility of that happening.
Increasingly, climate scientists are expressing their concerns of catastrophic warming if something serious isn't done very soon. In late November I read an interview of an administrator from the Tyndall Center for Climate Change Research. He basically said we needed to reduce global $CO_2$ emissions by 10%/year for many years and start immediately. That isn't going to happen.

If anything, I expect $CO_2$ emissions to increase over the next 10 years. China won't increase its emissions as quickly as in the recent past but I expect other developing countries will increase their emissions reasonably rapidly. There are billions of people living in developing countries that want to live like Americans. That requires consuming lots of fossil fuels.

It's appealing to think that we can run the American enterprise with renewable energy sources and everything would be as it has been with fossil fuels, except for the $CO_2$ emissions. But even with the maximum use of renewable sources, we would still require lots of fossil fuels. Some economists have calculated that if it costs X dollars to produce say 2% of our energy supply from renewable sources then if we multiple that cost by 49 we can get the total cost of running our enterprise with only renewable energy.

The problem is that from a practical perspective, renewable energy sources have limitations. One example is in terms of motor vehicles. Many of the applications that people use motor vehicles for require considerable power. Electric vehicles will always be limited in terms of power so a significant percentage of people would not buy electric vehicles based upon the desire for power in their motor vehicle.

Another problem is that the price of electric vehicles has historically been considerably higher than distillate powered vehicles and if anything that has grown worse because of the exotic materials used in modern electric vehicles to improve their efficiency. Most Americans aren't going to buy electric vehicles based upon the high price of the vehicles.

Another point in assuming electric vehicles would significantly reduce fossil fuel use is the assumption that the electricity that the vehicles use to be recharged would come from renewable sources. There has been a switch by many utilities to natural gas, in place of coal, but that is largely due to the present price advantage of natural gas over coal. When the price of natural gas increases sufficiently, as I expect it will, there well could be a switch back to coal by utilities.

That gets into the whole issue of electrical generation. If we rely on wind power for electrical generation, what do we do when the wind isn't blowing? Since wind velocity can change quickly and the power output from a wind generator is a cubic function of wind velocity, any backup must be able to respond immediately.

One option is to build a large overcapacity and a large storage system but that is very expensive. The alternative is to have a fossil fuel based power system on reserve, which is what is typically done. But if the backup has to be ready at a moment's notice, it has to be running continuously and there is not a lot of reduction in $CO_2$ emissions.

One aspect of global warming few people recognize is that most of the heat trapped by increasing greenhouse gas concentrations goes into the oceans (Figure 2), about 93%. Because of thermal inertia, even if human greenhouse gas emissions stopped today, the global temperature would continue rising until thermal equilibrium is reached between the oceans and the atmosphere at some point in the distant future.

We will test the premise that business-as-usual will have catastrophic effects. My primary concern is that major agricultural areas, such as the central U.S., will become considerably hotter and dryer. If that is the case, there could be a significant negative effect upon agriculture.

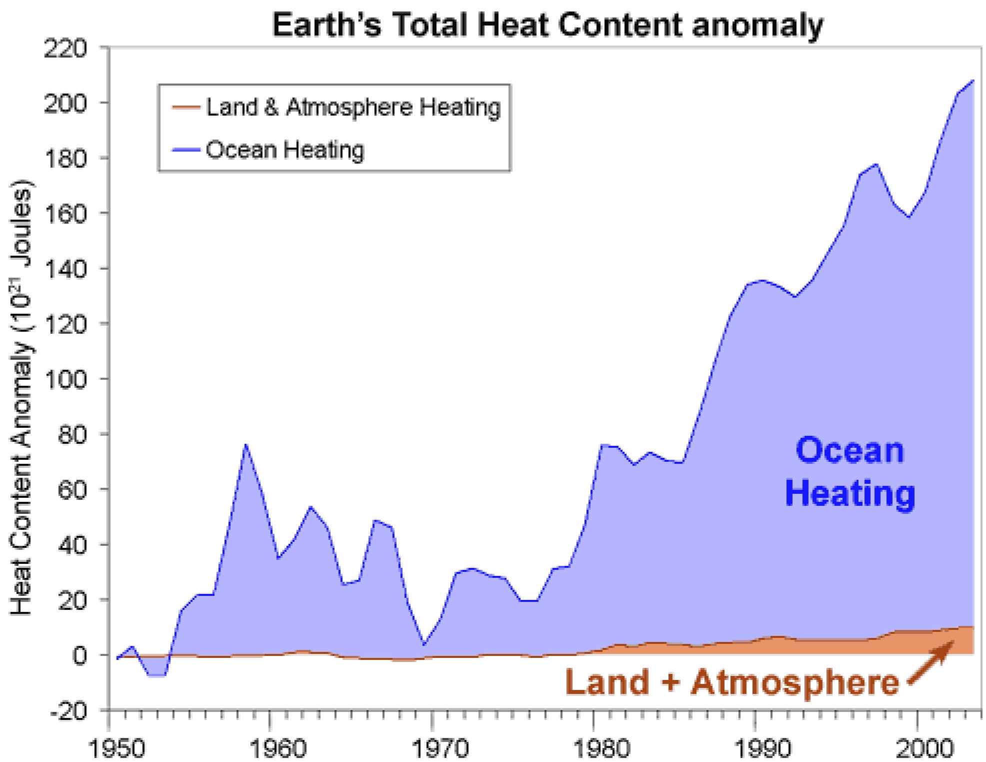


**Figure 2: Earth's total heat content anamaly**

**Roger**

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**Sierra Club Calendars**

The sale of Sierra Club calendars provides funds for the Three Lakes Group. If you would like calendars, they can be ordered from Annemarie Askwith at: askwitha@lighthouse.net
Price: $12 for wall; $13 for engagement.

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**Three Lakes Group Meetings**

Three Lakes Group meetings will be held on the second Tuesday of the month at 5:30 pm for the months in which we don't have programs: January, May, June, July, August and December. At this point in time it appears that the meetings will be held in one of the meeting rooms at Studebakers Restaurant on the I-75 Spur in Sault Ste. Marie but it's possible that may change. Notices will be sent out prior to meetings with the location included.