EAGLE POST 17

EAGLE POST - The newsletter of **Friends of Eagles Nest Wilderness**, apprising you of important activities in and around Eagles Nest, Holy Cross, and Ptarmigan Wilderness Areas.

Dear *|FNAME|*,

Greetings!

Our **topic this month**:
Global Warming in the Gore Range

INTRODUCTION: Earth Day (April 22) last year was the deadline for the 196 participating nations to sign on to the Paris Climate Agreement, designed to slow global warming by limiting greenhouse gas emissions. One-hundred-ninety- five of the 196 countries have signed on. The United States, of course, is the lone dissenter, a colossal tragedy that cedes world leadership on one of the most threatening global challenges facing humanity. France has announced a plan to **ban all gasoline and diesel vehicles** by 2040. Moreover, after 2022 France will **not produce electricity by burning coal.**

Throughout much of the US, state and local governments, businesses, and non-profits are picking up at least some of the slack left by President Trump's decision to abandon the Paris Agreement. But it's daunting for an individual to contemplate helping in a meaningful way. Below, David Schimel, a world authority on climate change (and Summit Country homeowner), describes climate changes in the Gore Range - with personal anecdotes and hard data - and offers encouraging suggestions for how individuals can help.

Global warming in the Gore Range

By David Schimel, PhD

On my first trip into the Gores, in 1975, a group of college friends and I skied in to try a winter ascent of Mt Powell. We didn't succeed,
though we did ski up Kneeknocker Pass,
something I wouldn't even think of doing today,
knowing what I know now. The first four days or

so of the trip were bitterly cold. I remember waking one morning to our thermometer reading -30 degrees F. For this article, I went looking for weather records from those weeks and the only daily weather record I could find, for Breckenridge, showed persistent cold those days, dropping to -28 degrees in town the day we saw -30. When I moved to Ft. Collins four years later, we regularly had winter spells well below zero. It rarely gets that cold anymore, and so my memory of Gore Range winters spans a period of significant climate change.

One of the most evident signs of climate change in the Rockies has been the gradual loss of these bitterly cold spells in the winter, at least for those of us with long memories, and while summers may be hotter and springs earlier, some of the largest changes to our Rocky Mountain climate have come in the steady winter warming and loss of winter lows. Most of Colorado's low temperature records were set decades ago, and recent years have been more notable for record highs. This loss of deep cold in the winter is a partial explanation for the severity of Mountain Pine Beetle outbreaks, as spells of sustained cold weather are required to kill the overwintering beetles.

Springs have arrived earlier, too. Snowmelt and streamflow now come nearly a month earlier than 30 or 40 years ago, and this has consequences for everything from forest health and growth to water availability downstream. Earlier snowmelt with trees starting to grow earlier often has a paradoxical effect, as shown by my friend and colleague Russ Monson at CU: because trees grow earlier, they actually deplete the snow-derived water sooner and suffer worse droughts later in the summer. Thus, even though trees grow a little more in warm, early springs, they grow less overall those years.

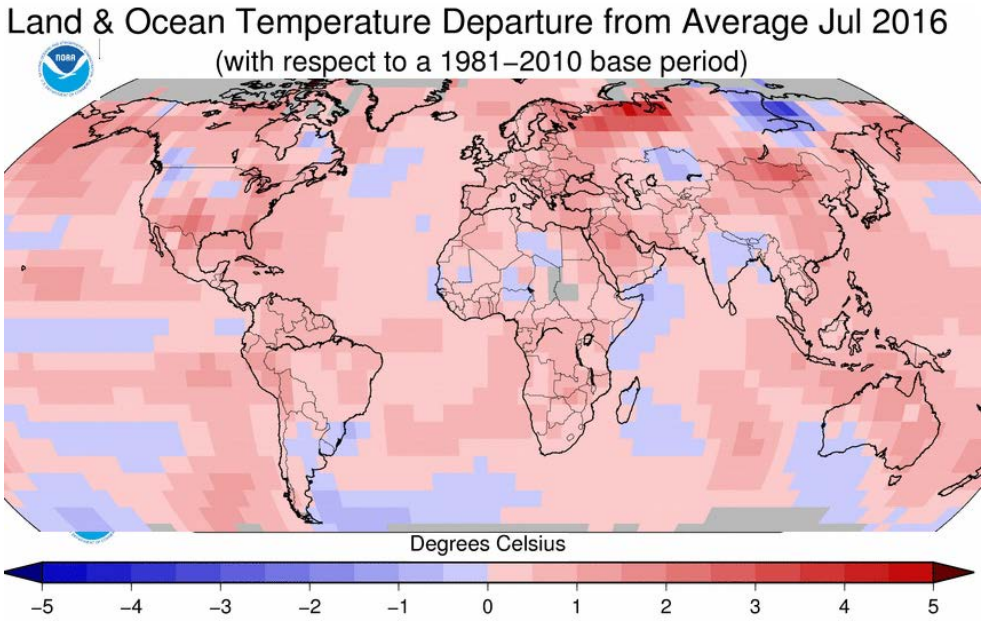
The earlier springs are due partly to warmer weather, but not always the way you might think. Warmer, drier winters in the 4 Corners area, together with loss of grass cover from grazing, lead to more ***dust*** being blown onto distant snowfields. That dust absorbs the sun's energy and melts the snow faster. Clean, white snow absorbs less than 10% of the sun's energy, but dirty snow absorbs much more. Even when it gets buried by fresh snow, as the snowpack later melts, the dust will be re-exposed and accelerate melting. Scientist Tom Painter and CU researchers have shown that changes to dust over the Rockies have had a big effect on snow, even detectable in the timing of runoff down the Colorado River.

Climate change has become a confusing and controversial subject, at least in the United States, where it's become tangled with partisan debate over environmental regulation. The actual physics of climate change are simple. The sun provides energy to the Earth, mostly in the visible wavelengths, and

that energy becomes heat (infrared energy) when absorbed by the Earth. Our atmosphere is transparent to the sun's radiation, but so-called greenhouse gases (transparent to visible wavelengths from the sun) block some of the re-radiated heat from escaping. Some greenhouse gases are necessary: without this effect, the Earth would be too cold to support life, but the superabundance of some of the gases released from burning fossil fuels is blocking even more of the heat from escaping, adding to the planet's warmth.

Carbon dioxide (CO2) is the main greenhouse gas; its inexorable rise has been charted for decades, mostly by a group of scientists headquartered in Boulder, at the National Oceanic and Atmospheric Administration (NOAA). These researchers make painstaking, precise measurements of CO2, continuing the work begun by the pioneer of climate change, Dave Keeling. Dave grew up in Montana, was a frequent visitor to Colorado, and loved hiking in the Rockies. When CO2, the same gas we breathe out, mixes in the atmosphere, its impacts on climate vary with place and season. This local variation makes the details of climate change complicated even though the underlying physics are simple!

CO2 is distributed uniformly in the atmosphere, but clouds and water vapor vary greatly between locations and over the seasons. Clouds reflect sunlight, and can reduce the amount of energy available to become heat, and water vapor can trap additional heat beyond that trapped by CO2. We all know that clouds and humidity vary from place to place, and with the seasons, and so does the little bit of extra warming from CO2. So, while Colorado warms on the average, some places warm more or less. We can see this in maps of warming (below).



Maps of climate change in Colorado show winters (December to February) in the Gore Range have warmed by about one degree Fahrenheit since 1951. A degree might seem small, but a few degrees in the colder direction is all that separates us from the ice ages, when the Rockies and our Gore Range valleys were filled with the glaciers that shaped our landscapes.

Changes to climate are going to affect out local environment in ways we see more and more in our daily lives in the mountains. We notice spring thaw and mid-winter cold. I notice warm wet snow sticking to my skis in February, formerly an April problem, one small but obtrusive change. We'll all notice the longer and more risky fire seasons, as longer dry spells and warm autumns allow fire season to extend into months formerly safe. We might see repeated outbreaks of the mountain pine beetle and other forest pests such as the spruce beetle. All of these insect pests grow more rapidly in warmer weather, and so all can do more damage during longer summers.

What can we do about climate change? As individuals, we can conserve, be aware of our activities that result in energy use, whether through our own energy use in cars or heating, or indirectly through what we buy. We can make investment decisions for our income or retirement informed by identifying which companies are seeking to reduce their energy use. Look into this—you may be surprised by how many companies see both good citizenship and good business in increasing their energy efficiency. For many of us - me for sure - most of our fossil fuel use may come through ***air travel.*** If you travel frequently, likely the bulk of your personal carbon footprint is from air travel. (Calculate your carbon footprint HERE)

While the carbon and climate problem may seem so big that it's hard to affect, really it results from myriad individual decisions and as a result, we have surprising control over our footprints. Many of the small changes we can make, in the cars we choose, home efficiency projects, whether we fly to or skype with a colleague, have big impacts. Because we, as Americans, use 2-100 times more energy than people in other countries, we can reduce our use more easily and more quickly!

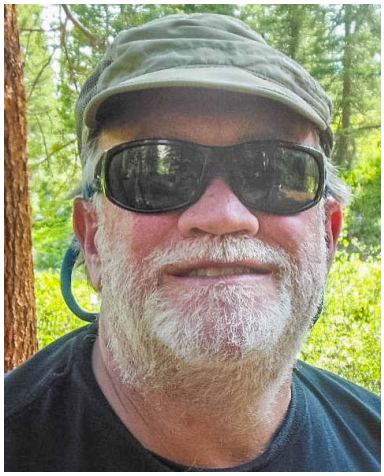
The US has increased economic output over the past decade or so with virtually no increase in fossil fuel consumption. This fact means both that we can conserve without damaging the economy, and that measures we've taken have had beneficial effects. Businesses that have invested in efficiency have generally been more profitable than

competitors that have not. We as conserving individuals can see this as well, paying less for heat, electricity and transportation.

What's the payoff? It's a longterm proposition. Even if we each do our part, we'll still see a changing climate through our lives, and into our children's - the profligate energy use of the post-war era will have consequences. But individual and corporate actions now will blunt the effects and help save our mountain paradise for distant generations.

Dust on snow photos from Colorado Dust-on-Snow (CODOS) Program, Center for Snow & Avalanche Studies, Silverton, CO

ABOUT DAVE SCHIMEL: Dave Schimel first came to Colorado to backcountry ski in the Gore Range in 1975, and moved to Colorado in 1979. He has never willingly left since. Schimel earned a PhD in Natural Resources from Colorado State in 1982, worked at CSU for many years, and then joined Boulder's National Center for Atmospheric Research as a climate scientist in 1991. He worked for NASA in 1988-1990 and returned to NASA's Jet Propulsion Lab in Pasadena, California in 2012, leading JPL's Carbon and Ecosystems program as part of the JPL Climate Science Center. He is known for his work on mountain ecosystems, and has flown over the Rockies in research aircraft many times, measuring the mountain climate and carbon cycle. He and his wife, long-time Summit County resident Dr. Susan Bonfield (ornithologist and FENW newsletter contributor) spend as much time as they can at their house on Pebble Creek and continue to explore the Gores and adjoining ranges. You can read more about Dave's illustrious career HERE.



Make a donation to FENW

Donate

Make a difference!

Volunteer for our **2017 Trail projects**: Details

Friday August 11: Day project: Conservation Colorado Joint Project. Silverthorne area of Eagles Nest. Reservations necessary (Bill Reed: 970-513-9741).

Recent Newsletters

- July: "The Continental Divide Wilderness & Recreation Act" by Josh Kuhn
- June: "The American Beaver: An Icon of the West" by Elissa Slezak
- May: "Meet Wilderness Manager Mike Beach" by Mike Beach
- April: "Future of Eagles Nest" by April Phule
- March: "Managing High Use

Thu-Sun, Sept 14-17: Pack-in project: Missouri Lakes Project. Two work days Holy Cross Wilderness. Reservations necessary (Tim Drescher: timdcy@gmail.com).
In 2016, we spent two weekends at alpine lakes and obliterated **54** illegal campfire rings. Join our crews in 2017!

Become a **Volunteer Wilderness Ranger** in 2018. Details.
In 2016, more than 50 VWRs contacted more than 12,000 hikers. *Greet & teach!*

We also need volunteers **outside the Wilderness**
If you're a **writer, social media advisor, website manager, marketer, event planner, meeter/greeter,** we need you! Email us (info@fenw.org)

Areas in Wilderness" by Kay Hopkins

- February: "A Cry From The Wilderness" by Bill Reed
- January: "Public Lands at Risk" by David Lien
- December: "My life as a Wilderness Manager" by Cindy Ebbert
- November: "Saving Native Cutthroat Trout" by Matt Grove
- October: "Loved to Death" by Jackie Fortier
- September: "Toward a Natural Forest" by Jim Furnish

Join us! for our next **Planning Meeting**
Thursday, August 24, 5:30 PM, USFS Silverthorne or Minturn
>> **MAP**
Details at www.fenw.org/

CITY MARKET COMMUNITY REWARDS PROGRAM
Please register your City Market Value Card, linking it to FENW, which will send rebates to FENW without compromising your earned fuel points. Please note that each card holder may only sign up for one tax exempt organization. **THANKS!**

|HTML:LIST_ADDRESS_HTML| *|END:IF|*

|IF:REWARDS| *|HTML:REWARDS|* *|END:IF|*