

Conclusion



Canyon Road near Mile 0.6.

Source: Art from Author's photograph, August 2017.

November 26th, 2017, 5:00 p.m. On my way to City Creek Canyon this evening, I stop along the way to look at Claude T. Barnes' home on Tenth Avenue. In that home, Barnes wrote "The Natural History of a Mountain Year: Four Seasons in the Wasatch Range" that was the inspiration for this journal. It is a quaint, still-well tended Craftsman era design, and Barnes lived about two blocks from Inspiration Point at the corner 11th Avenue and Bonneville Boulevard.

Over the thirty years that Barnes kept on his journals, he would have watched industrial mills in lower City Creek being removed and the transformation of the canyon's entrance into an urban park, Memory Grove. The air that he saw hanging over the winter city was choked with air pollution by residents using coal for home heating. Eventually, Barnes saw the air clear as homes changed to natural gas heating (Salt Lake Tribune, January 13th, 1960). He would have witnessed the arrival of the Cheat grass sea to the Salt Lake Salient and City Creek Canyon through the 1930s, but he also was present at the first attempts to reforest City Creek around the turn of the twentieth century and the more successful U. S. Forest Service program to reforest the other Salt

Lake Valley canyons between the 1910s to the 1930s (see [September 16th](#)). In 1909, the U. S. Forest Service had 2.8 million tree seedlings under cultivation at its Big Cottonwood Canyon nursery (*id*).

Parallels exist between Barnes' era and my own. Since 1900, the disruptive effects of automobiles and fossil fuels were deferred but not solved. With five more times the population and as many more automobiles as in Barnes' time, the valley's air in 2017 has again become thick and difficult to breathe, even with the transition to natural gas for heating and advances in reducing automobile emissions ([January 30th](#), [February 26th](#)). Hope for the future relies on optimism about uncertain technological advances and cultural changes that will transition consumers to self-driving and electric vehicles powered by sustainable energy. Water limitations on growth, experienced several times in Barnes' era, have again returned ([May 26th-May 27th](#)). A new, even more flammable invasive, Yellow star-thistle, threatens to again sweep over the Salt Lake Salient as Cheat grass did during Barnes' and Stegner's time ([June 16th](#), [July 8th](#)).

When Wallace Stegner returned to his adolescent and college Salt Lake City home in 1977, he expressed dismay at the changes that he found in the city ("At Home in the Fields of the Lord", Stegner 1980). To paraphrase Gertrude Stein's quote about her childhood Oakland, California, "there was no there there" remaining in Salt Lake City for Stegner.

I like to think that if Barnes could return and stand next to me tonight at Inspiration Point that he would take note of the 1989 ordinance that preserves City Creek Canyon, the federal wilderness areas along the face of the Wasatch Front Mountain Range, the Bonneville Shoreline Trail that connects them with City Creek Canyon, the success of local citizen groups in partially restraining high-density ski-resort development in Big and Little Cottonwood Canyons, public and private conservation land acquisitions, and the ongoing program to rehabilitate significant stretches of aquatic and bird habitats along the Jordan River. He would smile approvingly at the many steps that those who followed him took to keep the "there there" in City Creek and the other Salt Lake valley canyons that he visited and recorded as his personal refuge across three decades.

Thoreau's nature experience of the early nineteenth century can be replicated in the contemporary western United States by observing nature on a daily basis for one year. In some respects, nature experience in this present day western United States canyon adjacent to a major urban center exceeds nature in Thoreau's Concord of the 1850s. Species eradicated in the east during Thoreau's time such as moose, elk, otter, and bear still exist in City Creek Canyon today.

The benefits of consistent nature observation are many, and these include daily restoration of attention and executive functions ([April 23rd](#) and [April 24th](#)). My motivation in observing nature closely every day for one year came from Thoreau. He insisted that daily exposure to natural places was necessary for the maintenance of mental health ([July 13th](#)). Thoreau self-prescribed four hours of daily nature exposure (Thoreau 1862, 658), and he noted that "[t]here is a subtile [sic] magnetism in Nature, which, if we unconsciously yield to it, will direct us aright" ([Thoreau 1862](#), 662). I wondered if I would be set "aright", if I also focused on experiencing nature. After a year, some things became apparent.

I cannot claim to be set "aright", but after a year, I am more content. I like to think that I am a better person because I am kinder and gentler with others. When I go back to the canyon for restoration, I am more connected to the experience because I have an enhanced innate understanding of ecological relationships between the canyon's organisms. With the restoration of attention that a daily nature experience provides, I have a better perspective on the bombardment of political and news events that seek to monopolize one's limited allotment of daily concentration. Because the canyon provides me with a stable base, I am better prepared resist the wear of daily life.

When I return to the canyon after having this year of practicing intensive daily Thoreauian perception, I am struck by how much of the reality of nature that I filter out. Of my year's checklist tally of about 290 species, if I am not in an open state of mind, I perceive only a small segment of that diversity and can only touch a miniscule part of the potential three-hundred million interactions between those organisms ([June 14th](#)). Thoreau similarly concluded that "[n]ature is reported not by him who goes forth consciously as an observer, but in the fullness of life" ("Journal", July 2nd, 1852).

Distraction is the usual and understandable state in which most people experience the canyon, given the pressures of modern everyday life. After a year of practice, an expanded perception of this seemingly ordinary natural area occasionally breaks through the worries of living, and I am more attuned to experience that state of mind. In current popular parlance, on reentering the canyon, I can better enter a "flow state" with respect to perceiving the canyon's nature.

Some of this enhanced sensitivity comes from better a better opportunity to observe rare events that daily nature observation provides. Periodic, instead of daily, visits to the canyon misses key insect behavior, primarily because many insects utilize the R reproductive explosion strategy to avoid predation. Both Thoreau and Barnes noted that daily observation was necessary to see these infrequent events in nature (Thoreau, Journal, October 18th, 1859; Barnes, 4).

The pursuit of a Thoreauian nature experience is not self-absorbed. Nature experience is about sensitivity to the subtle relationships between plants, animals, geology and weather. There are few better metaphors for preparing oneself to better understand human relationships or to be a more caring, tolerant person ([July 13th](#)).

Thoreau's nineteenth century nature experience can be replicated, but it differs from his encounters in some significant ways:

First, the modern landscape has been substantially modified, not by population increase or development, but principally by anthropochory, *i.e.* - the importation of non-native plants and insects ([July 17th](#)). The Age of Exploration from the 1500s to the 1900s made new routes for plants and animals to move between formerly isolated continents, and the current Age of Globalization has accelerated those movements ([July 7th](#)).

As a result of anthropochory, the grasslands of Utah that comprise most of the State's and much of the Salt Lake salient and canyon's surface area look nothing like it did before the Euro-American colonization of 1847 ([March 4th](#), [5th](#) and [6th](#) (pre-colonization state); [March 6th](#), [July 7th](#) and [July 16th](#) (extinction of Rocky Mountain locust); [March 23rd](#) to [March 26th](#) (early lumbering and mining in the canyon); [April 23rd](#) (non-native plants); [July 7th](#)

and [July 8th](#) (livestock grazing and the Cheat grass invasion), [July 9th](#), (Hobo spider infestation)). The extent of the modification of the canyon's landscape by non-native plants, animals and insects is far more than the average Utahan is aware of. Even so, the natural residual is substantial and remains inspiring.

Second, the modern Thoreauian nature experience also is changed by information technology. That anyone can access vast reservoirs of sensor information about small areas of the Earth's surface and quickly find and read the newest scientific journal articles about weather, plants, insects and wildlife makes the modern nature experience different from Thoreau's explorations. This technological difference is not primarily in kind - Thoreau also traveled to Cambridge and consulted the leading books, journals and experts of this day. The difference is mostly in degree, but the incremental increase in information access can qualitatively change the modern encounter with nature ([July 13th](#)).

In one respect, our modern tools do differ in kind: our ability to make models with computers using mathematical techniques created after Thoreau's time give us an ability to look into the future with less uncertainty. I do not judge whether these changes are on the whole for the better or worse, but only note that these changes provide another more deep understanding of the world around us and that it is consistent with the modern era.

Just as Thoreau experienced nature within the context of social issues and augmented by the limitations of information technology of his time, and over the last year, I have similarly augmented my experience subject to the society and the limits of technology of my period. Those limits are shown in the daily science entries of this journal. We live in a time in which mathematical modeling has exploded, and it guides every aspect of modern scientific exploration, social policy-making and economic decision-making. This trend is also a reflection of increasing levels of education in our population over time. But mathematical models are only approximations, often inaccurate, of reality. Because of that abstraction and approximation, statistician and mathematical modeler George Box was famous for noting that "[a]ll models are wrong; some models are useful" (Box 1976).

These technological advances in and limitations of modeling makes it incumbent on citizens to understand the limits of scientists' and policy-

makers' conclusions ([April 26th](#)). Where appropriate and in limited cases, citizens must be prepared to reject modeling guidance and to make social and policy decisions on humanistic grounds. We should not, in George Box's words, become Pygmalion-like and fall in love with our own models (Box 1976), whether those models be of bird migrations, unemployment rates, homelessness, pre-history precipitation, streaming music selection, future climate modeling, financial markets, likelihood of species extinction, resume filtering, news filtering, or consumer goods purchase filtering.

In this regard and in response to the reproducibility crisis ([April 27th](#), Nuzzo 2014, Baker 2016), the modeling community has adopted various reforms that place on the burden of disclosing the limits of scientific and economic studies on the researcher. The American Statistical Association's 2016 statement on p-values is one formal example ([April 27th](#), Wasserstein 2016). The field of economics, Derman and Wittmott's Modelers' Hippocratic Oath, in which the modeler vows to not over-represent their results, is an informal example (Derman and Wittmott 2012). Again, the foregoing should not be read as a rejection with Big Data or modeling. It is a call for both citizens and scientists to use such tools with understanding, caution, and humility in order to minimize unintended consequences.

This journal has also been an exploration into the early history of Salt Lake City from an environmental perspective, and that exploration has given me a better appreciation of a generation of predecessor conservationists. There is a current generation of Utah conservationists and environmentalists who have spent a lifetime attending hearings and responding to a seemingly endless stream of development proposals to preserve the canyons of the Salt Lake valley. The history of City Creek Canyon and more broadly of northern Utah reveals a rich history in which what we presently view as a relatively pristine montane habitat has been injured and then rehabilitated through reforestation by an earlier generation of conservationists between 1900 and 1940, including Barnes, Cottam, Forsling, Bailey, and the Utah Forestry Association. Decimated deer and moose herds and extirpated elk herds were rebuilt. The earlier conservationists were successful in their lifetime of efforts, and they left us a relatively repaired Wasatch Front Mountain Range.

For the present of the current generation of conservationists and

environmentalists, it is easy to lose perspective in challenges of daily life of the cumulative impact that their efforts have over thirty or more years. Just a few of many names in the current generation include George Nickas of the Utah Wilderness Association who brought us wilderness areas at western ends of some of the Salt Lake valley canyons, Rick Reese of the Bonneville Shoreline Trail Association, Gale Dick (d.), Alexis Kelner, and Carl Fischer of the Citizen's Committee to Save Our Canyons, Ann Wechsler (d.) of the Utah Sierra Club, Joan DeGorgio of the Utah Nature Conservancy, planner and former Mayor Ralph Becker, local attorney Patrick Shea, the Utah Audubon Society, and the Utah Native Plant Society. Many others exist but are omitted here for the sake of brevity. Their contribution has been the continued partial preservation of the core montane habitat of the Wasatch Front Mountain Range, acquisition of the key land parcels, and preservation of the Great Salt Lake marshes as an international migratory fly .

This exploration of nature in and history of City Creek Canyon also revealed some cautionary environmental issues that deserve awareness by present and future Salt Lake City residents. On June 16th, 1881, J. J. Branch, a former L.D.S. Church member turned outcast evangelist, predicted that God would send a great flood from City Creek Canyon to destroy the City in retribution for the "wickedness and lying and blasphemy and abomination" of the L.D.S. church (Salt Lake Tribune). While Branch can be disregarded as a religious fanatic, as is sometimes the case, there is a modern scientific basis for such predictions.

In two contemporary policy decisions by Salt Lake City, insufficient weight was given to the potential for catastrophic snowmelt and-or cloudburst floods to again flood the downtown. Those decisions warrant re-examination. Another issue involves the potential for the Great Salt Lake to evaporate and to become dry lake bed. If the Great Salt Lake dries out, the resulting dust storms may make continued habitation of Salt Lake City questionable.

First, after the 1983 downtown flood from high snowmelt waters, the City rebuilt the storm sewers that diverted City Creek Canyon stream from its historical delta on which the modern downtown is constructed, sufficient to handle 210 cubic feet per second flow. That capacity, which is sized at about a ninetieth percentile snowmelt flood event, is insufficient to handle future

extreme high snowmelt or cloudburst flooding events. The highest daily recorded flow in City Creek from the 1983 flood was 331 cubic feet per second ([March 12th](#) to [March 14th](#)).

The need for a higher capacity City Creek storm sewer is particularly true in light of recent research that indicates Utah's climate is regressing to a 500 year mean pattern (*id*). In that weather pattern, the City's climate will be drier, but also will be punctuated by more severe peak precipitation events. A permanent, higher capacity solution to carry City Creek storm flows proposed in 2007 by the Army Corps of Engineers envisaged moving City Creek along North Temple from 300 West to the Jordan River on a proposed abandoned railway right-of-way ([March 13th](#), Love 2007). But the City decided not to pursue that 20 million USD project, and instead used the proposed above ground route for an interurban railway.

A large fire in City Creek Canyon or a subdivision destroying fire amongst the luxury homes built in the Cheat grass sea on the south slope of the Salt Lake Salient, coupled with a rare cloudburst event could send floodwaters down City Creek or the Avenues neighborhood of more than the 2,400 cubic feet per second that issued from Perry's Hollow in 1945 ([July 8th](#)). The diversion of City Creek Canyon stream to the west of the downtown was a historical urban planning mistake caused by the Mormon Church's insistence on adherence to a divinely inspired grid plan ([March 10th](#) and [March 14th](#)).

In light of the current and planned high density residential development of the downtown, the initial urban planning error made during the City's foundation should be permanently corrected by infrastructure improvements that can carry City Creek's future floodwaters. Expanding the capacity of the underground conduit is one option. Another speculative option would be to revive a variant of the canyon bridge concept near 11th Avenue, but not for transportation. Although a dam is inappropriate at that site due to the many geologic faults that cross the canyon's mouth, a flood control structure that would temporarily hold cloudburst flood waters might be evaluated. Any remedy will be costly.

Second, in 2010, the City decided not to pursue a controlled-burn experiment for the oak forest and cheat grass hillsides in City Creek Canyon ([April 23rd](#), [July 8th](#)). Such controlled burns should be reconsidered in consultation with

national experts (Young and Clements 2009, Monson and Kitchen 1992) in order to restore native Wild bunchgrass. Cheat grass is too susceptible to frequent burns that put the City at risk for subsequent summer cloudburst flooding. At costs around 1,000 USD per acre to treat about 8 square miles (5,120 acres), a rough estimated total cost is 5 million USD. Given past resistance by luxury homeowners in subdivisions that were allowed to ring the canyon's mouth and the Cheat grass sea on the southern side of the Salt Lake Salient since the 1960s, a controlled burn program within middle City Creek Canyon will require political leadership.

Third, the City should consider renewed efforts at reforestation of City Creek. This would enhance City Creek as a recreation area and reduce the potential of future cloudburst flooding.

Fourth, human-mountain lion interactions infrequently occur in the canyon and on the southern slope of the Salt Lake leading down to the City cemetery. In order to reduce the possibility of mountain lion attacks on children that would lead to calls for extermination of lions in the canyon, the City should work with the Utah Division of Wildlife Services to encourage systematic non-lethal track-and-tree hunts of cougars in the canyon and along the foothills. The purpose of such track-and-treeing is to establish a stable population of five-year or older cougars in the area that have learned to fear humans. Appropriately educated mountain lions are a lower risk for attempting to attack humans. Humans and mountain lions in the canyon, in the Avenues neighborhood, and along the urbanized along the northern foothills can co-exist.

Fifth, the City should continue and expand its work with State authorities including the Utah Division of Water Resources and the Great Salt Lake Commission to determine the population carrying capacity of the Wasatch Front given the water supply constraint of not drying up the lake bed of the Great Salt Lake (see Bardsley et al. 2013; Salt Lake City Corp. 2014). If more water is withdrawn for human consumption, it is probable, and not a speculative proposition that almost all of the Great Salt Lake will disappear in the next thirty years ([May 26th](#)). If the Great Salt Lake disappears like the Aral Sea on the Kazakhstan and Uzbekistan border or the Salton Sea in southern California, great dust haboob-like dust storms may make the City an

undesirable, if not uninhabitable, place to live. As in many social and environmental issues, as Utah's largest city, Salt Lake City needs to take a self-interested lead on this question and not to leave the matter to Utah State government, notwithstanding jurisdictional issues. The evaporation of the Great Salt Lake is an existential threat to the City and the health of its human residents as the lakebed has been accumulating over 100 years of toxic metals flowing downstream from Wasatch Front cities.

Additionally, the loss of Great Salt Lake as a transnational, continental migratory bird flyway would have morally inexcusable impacts on Utah's birds, on northern Utah's forests, and on western North American continental bird populations ([May 22nd](#) to [May 24th](#)). The extinction of the trillions of Rocky Mountain locust in the west and the transformation of its grasslands with Cheat grass are testaments to the human ability to induce large scale changes to the west's and Utah's environment through simple inattention ([July 16th](#)).

Sixth, Salt Lake City recently replaced its director of the Department of Public Utilities, a position which has traditionally been filled by an in-house engineer since L. C. Kelsey was first installed on March 15th, 1898. The 2017 replacement has a masters in business administration and is not an engineer, but has long-experience with water resource management (Bardsley et al. 2013; Greenhalgh 2014).

Lessons from the drought of 1934 are instructive about whether engineers or economists should be the lead in making water supply decisions. Between 1900 and the 1920s, Kelsey led an ambitious and costly infrastructure program to build a series of dams in Parley's and Big Cottonwood Canyons to support a city of up to 600,000 persons. Large public infrastructure projects are what engineers are trained to do and what they like to do. Even so, those massive projects fell short in light of the severe drought of 1934, and in that year, the City had to embark on an expensive, emergency program of drilling supplemental artesian wells (Salt Lake Tribune, June 24th, 1934 and January 13th, 1935). It was only because Kelsey had worked to create an over-built, robust water supply system that during the 1934 drought, Salt Lake City survived. Had he not erred on the side of over-capacity, it is likely that in 1934 Salt Lake City would have ceased to exist. The potential for severe,

unanticipated droughts remain ([February 9th](#), [July 21st](#), Bekker 2014).

That tradition of expensive, over-engineered water supply solutions continued through the 1960s and the years of the Central Utah Project. Despite the cost of big engineering water solutions, the arrival of CUP water in 2009 is driving Salt Lake City's and County's current economic expansion. The provision of inexpensive, subsidized, clean water is the foundation of any western State's economy. This should not be read to imply that future engineering solutions have to be in the form of large dams and water withdrawals from the Great Salt Lake, but it is engineers and not free-market economists that are the best profession that is equipped to address such issues.

Seventh, since its founding, Salt Lake City was designed as a city of trees, and it was envisaged as an oasis in an arid land. While the recent growth of high-density apartment blocks in the urban core is a necessary response to more efficiently use declining water resources, the City by overly accommodating developers is transforming itself into another western concrete oasis. Urban design policies should be changed for this new construction that better incorporates trees and nature into the downtown and that preserves the City's original vision as a "Diamond in the Desert".

Eighth, with respect to the continuing national debate concerning trade-offs between economic expansion and environmental development, the history of the exploitation of City Creek Canyon and its preservation mirrors the larger debate framed by Thoreau in the nineteenth century. As economic expansion occurs, what should be left alone? Wallace Stegner documented the failure of the nation to preserve lands as suggested by Thoreau, and as a representative of the twentieth century, Stegner lobbied for the completion of Thoreau's worldview. The modern environmental movement expanded that issue by insisting on the preservation of health from the deleterious effects of industrialization. The national consensus in favor of a healthy urban environment led to both the improved air quality enjoyed in America today ([February 8th](#), [February 26th](#)).

The national consensus for a healthier environment also led to the offshoring of polluting industries and United States manufacturing jobs to India, Indonesia, and China ([February 26th](#)). A consequence of that trade-off has

been increased economic inequality in the United States and other countries suffering the adverse effects of our consumption. As I write this, the Air Quality Index in Salt Lake City is 28; in parts of Beijing, the AQI is 216. The cultural and engineering challenge for the United States for the next generation is development of zero-pollution manufacturing techniques in order to return of manufacturing to the United States without the associated ill effects of pollution. This is a matter of national and cultural will.

Ninth, the natural history of City Creek Canyon contradicts the prevailing Western cultural view that nature is something that human technology can overcome and that humankind is separate from. Even in our modern high technological society, the canyon and the Salt Lake valley remain constrained by the environment and by distant forces. The annual precipitation that the Wasatch Front cities of 3 million persons depend upon include the Pacific Quasi-Decadal Oscillation and events in the distant Pacific Ocean off of Japan ([February 7th](#)). Salt Lake City current sits on a unique minimum of its long-term precipitation cycle ([March 1st](#)). The history and development of Salt Lake City is intimately tied to the PQDO and longer-term drought cycles (*id*, [February 3rd](#)). Cloudburst flooding still threatens the City's central business district despite increases in the capacity of the storm water system ([March 10th](#) to [March 13th](#)).

Quick burning invasive Cheat grass threatens both the city and canyon with fire ([July 7th](#), [July 8th](#)). The Cheat grass invasion was one example of how the Age of Exploration brought distant organisms to Utah that have reshaped its biota through anthropochory ([July 7th](#), [April 2nd](#), [July 17th](#)). A major earthquake that is beyond human control may destroy the city within the next 100 years ([January 2nd](#)).

Population growth in the valley has again reached constraints in terms of air quality ([December 28th](#), [February 26th](#), [February 27th](#)). Twenty percent of the spring ozone that pollutes its air comes across the ocean from Asia ([August 3rd](#)). Northern Utah is also nearing its environmental limits in terms of its water supply as evidenced by the drying of the Great Salt Lake's eastern bed ([May 26th](#), [May 27th](#), [May 28th](#)).

The first greatest threat to the City's long-term future is the prevailing belief of its residents that they do not live subject to constraints imposed by nature.

While technological optimism and economics may allow the city to meet those challenges as they have in the past, these examples from the canyon and City illustrate that for our technological prowess, modern humankind lives within and not separate from the natural environment. The development of the New Ecological Paradigm ([April 29th](#)), in which some people express the fear that environment is chaotically unraveling, suggests that in our hearts that we know this to be true, even though we do not act as if it were true.

The second greatest threat to the City is modern nihilism that stays the hand of ordinary citizens in shaping the City's environmental future ([November 12th](#)). Modern nihilism and the New Ecological Paradigm is linked to the current experience of exponential growth of population and a fear of a global Malthusian collapse. Thomas Malthus, the eighteenth century scholar, predicted that absent stringent birth controls civilizations would collapse as exponential population growth inexorably outstrips a culture's ability to produce food and its resources - its carrying capacity. Due to increasing technology, repeated predictions of Malthusian collapse since the mid-1800s have not come to pass, *e.g.* - the Green Revolution of the 1960s forestalled early global famine and globalization has increased transportation efficiencies sufficient to support 7 billion people.

Physicist and Santa Fe Institute leader Geoffrey West in his recent book *Scale* speculatively notes, based on prior work by physicists Johansen and Sornette at UCLA, that there is temporal pattern to the repetition of avoiding population collapses through technological prowess (West 2017; Johansen and Sornette 2001). Since 1850, and as reflected world population growth and financial indices, the time between successive innovations that avoid collapse is decreasing (*id*; West, Chap. 10). This is a testament to the ability of technological innovation to solve societal problems. But their observation of the decreasing period between transformative innovations suggests that some limit exists to the ability of technology to avoid a future collapses in the face of exponentially increasing economic growth. They denote such a limit with a mathematical term: a "finite-time singularity".

West concludes that a retreat into ecological nihilism is not appropriate, as the forces at work remains unclear. West views the approach of a singularity as simply indicating that some new, presently unseen, cultural and

technological change is on the horizon (*id* at 425). In the last ten years, it has become increasingly evident that even minor changes in the lifestyles of members of the developed first-world nations can radically alter human demands on the globe, and locally, within Utah, the City and the canyon.

This suggests that the next ecological singularity, that will transform the City and canyon may well be *social* as opposed to *technological* (see Johansen and Sornette 2001). That transformation may be as radical as the changes that the City and the canyon experienced between the Euro-American arrival in 1847 and 1927. This is a source for future optimism. The approach of a singularity, underscores the need for ordinary citizens to preserve and protect what natural areas that exist in the western United States, within Salt Lake County, and within the canyon.

A final ancillary historical matter is the massacre of Utah and Salt Lake Ute band First Peoples in the 1850 at Table Mountain ([March 8th](#)). I hope the review contained in this writing provides an opportunity for historical reconciliation between the L.D.S. Church and the Ute Nation similar to that which occurred with respect to the Mountain Meadows massacre. Although Salt Lake City was incorporated in 1851 and after the Table Mountain Massacre, given the nexus between the City's early leaders and the Nauvoo Legion, it may be appropriate for the City to directly issue a reconciliation apology.

The second major question that this year in City Creek Canyon sought to answer was: How do natural areas come to be preserved? A final lesson from a year pursuing a Thoreauian experience is that our modern nature experience with its greatly increased access to scientific information does not change the basic moral quandary identified by Henry David: When does one decide to invest the personal energy to move out of that gray area between the injustices committed by our communities in our name and the desire to choose the easier course of becoming insensitive to them (Menrod 2012)?

The history of City Creek Canyon's preservation as a natural area is instructive. The decision to remove an area from commerce ([April 7th](#), [April 27th](#)) in order to serve the inherent non-economic needs of citizens for recreation and nature ([April 19th](#) to [April 27th](#)) is the sum of a thousand individual actions. It is not just result of visionary leaders making decisions

for the benefit of citizens.

Resident's opposition to various proposals over 100 years kept City Creek Canyon relatively underdeveloped. Development proposals included the platted city of Modoc in the 1870s ([January 19th](#)); a mining railroad down 4th Avenue and City Creek in 1883 ([December 22nd](#)); a lighter-than-airship port in 1909 ([December 29th](#)); an electric power plant in 1911 ([February 9th](#)); a luxury subdivision in 1915 ([August 29th](#)); a toboggan run in 1924 ([December 31st](#)); a winter sports complex in 1944 ([October 11th](#)); and in 2002, five 160 foot tall brightly lit Olympic ovals ([October 5th](#), [February 15th](#)). Three different dam sites were repeatedly considered in the canyon in 1888 ([April 23rd](#), [May 6th](#)), in 1890 ([December 19th](#)), in 1913 ([January 14th](#), [April 4th](#) and [April 8th](#)), in 1921 ([June 3rd](#)), and most recently in 1984 ([February 14th](#)). Numerous attempts were made to build bridges across the lower canyon in 1890 ([July 12th](#)), in 1892 (ordinance passed to design a bridge, [April 2nd](#)), in 1909 ([April 18th](#)), in 1912 ([August 11th](#)), in 1920 ([April 25th](#), [May 4th](#)), in 1925 ([February 1st](#)), in 1933-35 ([April 2nd](#), [April 16th](#)), in 1941 ([January 18th](#)), in 1945 ([May 19th](#)), in 1948 ([October 15th](#)), and in 1961 ([October 11th](#)). Many attempts were made to build highways through the canyon in 1886 ([July 26th](#)), in 1891-1892 ([August 8th](#), [October 2nd](#), [October 8th](#), [April 2nd](#)), in 1896 ([February 19th](#)), in 1912-1913 ([December 3rd](#), [January 14th](#), [April 23rd](#), [May 13th](#), [May 24th](#), [June 7th](#)), in 1916 ([September 26th](#)), in 1921 ([July 29th](#), [August 3rd](#), [August 19th](#)), in 1933 ([April 16th](#)), in 1977 ([March 2nd](#)), and most recently in 2010 ([March 17th](#)). On three occasions the City tried to give away portions or all of the canyon: in 1916 ([September 11th](#), discussed giving away with the whole canyon to the State), and in 1971 ([May 27th](#), the City tried to give Upper Rotary Park back to the State of Utah after the State returned title to the park to the City).

Did ordinary citizens oppose these proposals or was their defeat the result of far seeing leaders in City government? The primary record of the City's history are its newspapers, and those show scant evidence of direct citizen involvement. For the most part, the public record is of the opinions and actions of public officials (see "People" in "[Cast of Characters](#)"). In 1883, a mass meeting was held in the Avenues to oppose a railroad ([December 22nd](#)); in 1909, a women's committee gathered 1,700 signatures in support of

closing all gravel operations in lower City Creek Canyon and converting the area into a park ([September 14th](#)); in 1910, another women's group petitioned the city to remove industrial sites from lower City Creek ([October 11th](#)); in 1984, about 200 people attended hearings on the City's proposed City Creek Master Plan ([September 29th](#)); and in 1984 two residents collected 1,100 signatures in support of closing City Creek Canyon to automobile traffic ([April 1st](#)).

Based on personal observation between 1978 and the adoption of the 2016 Mountain Accord ([April 5th](#)), the newspaper record is a biased observation that focuses on inexpensively gathered responses of public officials. For the period that I have lived through, thousands of people participated in numerous community and environmental group meetings concerning tourism development of the Salt Lake valley's other canyons, but those activities are not often included in newspapers' record of public decision making. Comments for or against a development proposal by governmental or commercial leaders is the principal focus of newsgathering; the people's history is not written down. Current and future citizens who may wish to become involved in environmental matters should take note of this, as often responding to development proposals can seem like a memory-less, never-ending task ([April 28th](#)).

Assuming that these same processes occurred in the past with respect to proposals to develop City Creek Canyon, the reason early proposals did not come to fruition was similarly the result of community opposition. What were the motivations in City residents who resisted these development proposals in City Creek?

After the initial arrival of the Euro-American colonists, there was little attempt to preserve City Creek through the 1870s, even given that Brigham Young reserved the canyon as his personal property or as a resource held for quasi-public trust purposes. The canyon above present day Guardhouse Gate at Bonneville Drive and Canyon Road was heavily logged and mined between the 1850s and 1880s. Below Guardhouse Gate in addition to low impact water-powered industries, a gravel pit and in the 1900s an asphalt plant ([October 1st](#), [October 14th](#)) operated.

It was not until the population of the City increased from the arrival of the

transcontinental railroad in the 1870s and a new middle-class arose in during the 1890s to the 1900s (Moore 2011) that a social consensus formed to protect the canyon above Guardhouse Gate so the City could have clean drinking water. As this new middle class formed in Salt Lake, they also needed low cost recreation in a natural environment that was nearby and that within the limits of their horse-drawn technology. As automobile dependent moderns, we have become disconnected from the limited transportation era at the turn of the end of the twentieth century, where the principal weekend recreation consisted of going to parks within walking distance.

This is when the first impetus to preserve the upper canyon above Guardhouse Gate began. As the middle class grew, they and their children also needed nearby areas for recreation. Between 1900 to 1920, this led to the removal of the remaining legacy industrial sites in the lower canyon and initiatives to expand the City's park system around Ensign Peak and lower City Creek.

The second motivation was water-borne disease. In the late nineteenth and early twentieth centuries, the impetus to preserve City Creek Canyon as a natural area was principally driven from City residents' desire to protect their children from water borne diseases. Between 1847 and 1924, typhus killed an estimated 1,500 Salt Lake adults and children and infected another 18,000 ([March 28th](#), Cater at 94, ftn 5; Richards). During that period, another 3,900 infants passed away from diarrheal diseases that were also incidentally caused by unsanitary drinking water and primitive sanitation facilities. Salt Lake's then seventy-year typhus epidemic was capped in 1918 by the Influenza Pandemic of 1918 that killed 117 within four weeks and left another 1,500 bedridden. Those disease related deaths created a deep, unconscious scar on the psyche of the City's residents that in the 1970s and 1980s favored preservation of the canyon in order to assure a permanent, clean water supply.

But this social consensus for high quality water supplies conflicted with new transportation technology (see Richards, 177-192). In the 1930s and 1940s as the new disruptive technology of the automobile became widespread, the new mobility allowed for more dispersed recreation in the canyon. But city residents forgot the lessons of the nineteenth century. In 1950, due to high

coliform counts in City Creek Canyon caused by improper recreation behavior, the canyon was closed to all entry, and City had to embark on an expensive program of water purification (Salt Lake City Tribune, June 29th, 1966) and to formulate new restrictions on canyon access in order to restore and improve water quality. Through this second experience with water-borne diseases during the 1950s, residents relearned earlier lessons of water protection from the nineteenth century.

While modern water treatment technology and antibiotics has obviated the concern of water-borne disease, in the 1960s, a new major motivation rose from the need for recreation. Stegner updated Thoreau's nineteenth insights and identified a new motivation to continue to protect and preserve City Creek Canyon and the other Salt Lake Valley canyons: the equally important need to preserve mental health and well-being in an increasingly industrialized urban environment ([July 13th](#)).

A third motivation that led to the preservation of City Creek Canyon was economic development through tourism and manufacturing and the early alignment of commercial and ordinary citizen interests to protect the water supply. Since the canyon had to remain in a relatively undeveloped state to provide clean water, it was a natural fit for the city to promote the canyon for tourism. Rear Admiral Jason Henry Selwyn's 1893 plan for a scenic Wasatch Boulevard was the earliest incarnation of that effort ([January 21st](#)). In 1891, commercial interests proposed that after tourists on the transcontinental railroad arrived, they would have a day of touring in a horse drawn carriage up City Creek Canyon and along the Bonneville Shoreline as an introduction to the Rocky Mountains ([April 2nd](#)). When the then new technology of the automobile arrived along with the transcontinental Lincoln Highway in 1911, City Creek Canyon Road, Bonneville Drive and Wasatch Boulevard were improved to support that form of tourism (Salt Lake Telegram and Salt Lake Tribune, May 29th, 1914, [March 29th](#)).

Beginning in 1903 and through 1927, the Commercial Club and the City embarked on an ambitious program to economically develop Salt Lake City as a transcontinental railroad hub - as originally envisaged when the railroad was completed in 1869 ([December 1st](#), Municipal Record December 1913). Key to that development was building enough water supply infrastructure to

support new industry and to increase the city's population from 100,000 to 500,000 persons persons ([January 1st](#) - 1903 Commercial Club plan). Voters approved several bonds in support of water infrastructure improvements ([March 1st](#) - 2M USD bonds in March 1919 and 3.3M USD bonds in March 1920; [December 1st](#) - 3M USD bonds in December 1929; [August 1st](#) - 1935 approval of formation of Metropolitan Water District). From 1903 to 1929, approximately 300 miles of water mains were laid, the streets paved, and 1.5 billion gallons of reservoir capacity was constructed ([January 1st](#), 1.5 billion gallons by January 1927; [November 1st](#) - 272 miles of water mains).

During this period, the interests of industry for clean water needed for commercial and residential expansion and of citizens for nearby dispersed outdoor recreation coincided through the 1950s. Those interests would begin to diverge in the 1950s as the canyons were perceived and developed to support destination ski tourism. But the alignment citizen and commercial water supply and protection interests for 50 years instilled a strong citizen ethic for preservation that carried over into the 1980s and to today.

As the new automobile technology developed in the 1950s and 1960s, the pressure to economically develop City Creek for railroad tourism dissipated. The initial pressure for tourism development in City Canyon came from its proximity to the City's core and that horse drawn transport had a 20 mile per day limit. As the auto age matured and the reasonable limit of daily travel increased to 100 or 200 miles, northern Utah's tourism industry turned its focus to more dramatic, higher terrain in Big and Little Cottonwood Canyons and ski snow sports instead of scenic pleasure travel. The petrochemical industry of the early 1900s brought other changes to the City. The arrival of natural gas to Salt Lake City in 1929 allowed the City to grow because the constraint of air pollution imposed by using coal for heating homes and businesses was released (Salt Lake Tribune, January 13th, 1960). By 2015, population growth in the valley and the rise in automobile use has, during the winters, again reached a new air pollution constraint.

In the 1980s, Salt Lake City, as were many other United States cities, was instituting an economic development plan based on theories of competitive centers fostered by influential Harvard Professor Michael Porter. In that model, cities would attempt to attract non-polluting research centers and

technology and financial companies. Cities would also develop quality-of-life amenities that the educated elite who would come to those centers of excellence would desire, *e.g.* - access to nearby natural areas and an unpolluted environment. In this sense, attracting upper-class educated residents by promoting nearby natural areas was a repeat of City's economic development through the real estate boom of the early 1900s in which the City expanded its park system. In the 1980s, the superior quality of the City's water supply was among those amenities that supported and still supports the community's economic development goals (see [April 28th](#)). In 2017, the downtown central business district is being rebuilt and transformed in that model. The construction boom of large box-like apartments and condominiums in and around the City's center is a continuation of and a reflection of that 1980s policy and of the Porter model. Large financial companies need housing for its low-middle income young workers who cannot afford homes.

A final causative factor that led to the preservation of City Creek Canyon as a natural area in the 1980s was randomness. A rare weather event - the 1983 100-year flood - destroyed the City Creek Canyon Road and closed the canyon to automobiles for two years. This gave City residents the recreational experience of an automobile free City Creek Canyon for an extended period of time, a segment of the City's population rediscovered in the canyon Stegner's dictum that "one means of sanity" was to hold on to nature ([July 13th](#)). That experience re-enforced their desire to have a permanent nearby natural setting for recreation ([April 1st](#)). Had the accidental flood not occurred, they would have been less insistent on adoption of City's 1986 City Creek Master Plan that called for the canyon's preservation.

These three forces - the desire for superior quality, clean water, the desire for close recreation in a natural setting, and the desire to integrate the canyon into the new economic development model - led to the social consensus to preserve City Creek. These three factors when combined with the fourth force of randomness resulted in City Creek Canyon being annexed by Salt Lake City and being zoned as a nature preserve in 1989 ([April 1st](#); Salt Lake City Ordinance 11-1989 dated March 21st, 1989).

Since the 1989, the desire of the City's residents for mental well-being and

healthy lifestyles, related in part to the rise of the biophilia movement ([April 19th](#) to [April 26th](#)), has been the driving force that keeps City Creek Canyon a protected natural area. The City has embarked on a program to build about 40,000 high-density block-type apartments in the City's core ([April 7th](#)). This trend should increase the pool and political weight of residents seeking nearby recreation in natural areas like City Creek Canyon, as they will have insufficient park lands in the downtown neighborhood to meet their need mental restoration.

Whether the New Ecological Paradigm ([April 29th](#)) - the sense that global ecology is unraveling as a result of humankind's activities - deteriorates into another necrophilous version of modern nihilism ([April 19th](#)) or whether it continues on the positive emotional path of biophilia remains to be seen (*id*). My hopes are for the latter. It is this new biophiliac social force that will continue to protect the canyon in the future.

Daily practice of Thoreauian nature observation can aid in staying on the path of biophilia. One method to combat nihilism is to identify and label it during daily conversations with friends and family.

In the canyon, this evolving biophilia culture currently conflicts with legacy multiple-use of hunting. How, or whether, increased regulation of hunting develops in the canyon in the future is unclear; however, since 1892, hunting has been periodically completely prohibited in the canyon and then again allowed (*e.g.* - 1892 complete ban, [December 28th](#) and [December 29th](#); see "Hunters, City Creek regulation of" in "[Index](#)").

In closing, given presence of the Mormon faith and since all things in Utah eventually return to issues of religion, what role did religion play in the preservation of the City Creek Canyon? The role of religion in the preservation of City Creek Canyon is reflective of the current national cultural division in the United States between faith and reason and between fundamentalist religions and rationalism.

One view is that the preservation of the canyon occurred in whole or part because a Latter Day Saints have a special cultural affinity for persevering the environment ([July 12th](#)). Because of this special and exceptional relationship, the Saints moved early to protect their canyons, unlike in other

secular western cities. In this view, history is examined to seek events that contain traces of divinity.

A second view is that the preservation of City Canyon was the result of ordinary secular developmental processes that are largely unremarkable within the range of early development of western urban centers. The Euro-American colonists excluded and exterminated the First Peoples and exploited resources. This was followed by a period of conservation to remediate the adverse consequences of that earlier resource overuse. This development pattern of Salt Lake City was largely indistinguishable from cities created by the other 400,000 settlers who traversed the Oregon Trail in the middle of the nineteenth century.

Between faith and reason, I have always lived in the latter rationalist camp, but I have become more tolerant of the role of faith in society. Faith and reason evidence the diversity of character in human societies. Bureaucratized science in the service of rationalized economics can lead to both environmental crises and to the creation of Fromm's *homo consumens* or "consumer man", or what we now call *homo economicus* who is concerned only with the act of consuming goods and services ([April 19th](#)). It can lead to *homo mechanicus* or "gadget man", who is obsessed with the newest consumer digital devices. But this is the same rationalism born in the Enlightenment that brings us the benefits of modern technology.

However, people of faith can provide a human moral center in times of crisis that secular society is unable to attain, *e.g.* - the civil rights era of the 1960s that sought to protect the dignity of racial minorities and the sanctuary movement of the 1980s that sought to protect refugees from Central American democide. But a faith-based personality too often suffers from the defect of a binary worldview, *i.e.* - that there is an exceptional "us" who have faith and a less-deserving "otherness" who do not ([July 15th](#)).

One of the better resolutions of the division between faith and reason was Pope John Paul II's observation that this dichotomy has a common "point of contact" in each outlook's mutual desire for the betterment of humankind, and therefore, the division is between two complimentary and not two opposing forces (*id*; Pope John Paul II 1992 and 1998). The two personalities based on faith and reason do not have to agree on their differing world views. They

only have to work together given the current environmental challenges that humanity faces to preserve "our common home" (*id*; same Pope Francis 2015 and "our common home").

This view is consistent with Nibley's reconstruction of early Mormon environmentalist doctrines (Ball 2011, [July 12th](#)). Similarly, Alexander notes that the history of the early church in the Salt Lake Valley should not be viewed as a failure to achieve a binary of absolutes between religious ideals and reality, but rather that history should be viewed as religious leaders who extoll their membership to better and higher behavior in an imperfect world (Alexander 2006, [July 12th](#)). That people fail to fully live up to those ideals, including Brigham Young himself, in an imperfect world is simply being human.

In conclusion, local religion as a cultural value played a minor role in the preservation of City Creek Canyon, but, again, by personality I am in the rationalist camp. As John F. Kennedy noted, "Our problems are man-made, therefore they may be solved by man." While intent as expressed in the statements of religious leaders is important, behavior and practical outcomes are more important. I appreciate that others whose personalities are faith-based may take a differing view.

Hopefully, this rendition of a historical success at preservation of one urban canyon can inspire current and future conservationists and environmentalists. The preservation of City Creek Canyon is an example of how, given a lifetime of community and governmental efforts, meaningful results can be achieved.

Future challenges that conservationists and environmentalists face with respect to City Creek Canyon, the Salt Lake salient, and international migratory bird fly long the Great Salt Lake turn in the twenty-first century, as they did in the twentieth, on the effects of the now well-established disruptive automobile technology. Unlike Barnes' 1950s view that nature is "no better, no worse for man" ([March 1st](#)), my own lay perception is that climate change is human induced, principally from automobile emissions. Although automobiles contribute between one-third and one-half of the air pollution burden, they released United States citizens to live on distant lots in large homes. The resulting increased demand for services and

goods from the suburban design of our cities creates more pollution, and a higher fraction than half of air pollution should be allocated to the still unresolved disruptive effect of cars.

Another of the main conservation and environmental challenges for the future is how to reduce the impact of large fires on the Wasatch Front Mountain Range and being ready to rehabilitate the Range and the canyon after a large fire. The West, including Utah and the canyon, are becoming drier. A drier Wasatch Front Mountain Range with its continuous pressure from small grass fires at the urban interface ([August 6th](#)) may lead to the return of large massive fires in the foothills and upper montane habitats seen between the 1880 and 1940. For the Wasatch Front Mountain Range and City Creek to recover, birds must be present to redistribute the forest's seeds ([July 17th](#)), and this is an additional human justification for preserving the Great Salt Lake marshes that attract continental migrating birds to northern Utah.

While whether global warming and climate change are human caused remains open to much social, but not scientific, debate, the Intermountain west is becoming drier. It is becoming drier either from human induced causes or because the Great Basin's climate is regressing to the mean climate of the last 13,000 years ([June 24th](#)). But the controlling concern is the effect of those increasing temperatures and what society's responses will be. Whether the cause of the change is natural or human will be immaterial, if western water reservoirs slowly fail to fill each year.

The year-long experience recorded here of a small protected natural area outside of this remote western metropolitan center can be illustrative for other citizens. Based on this example, others might wish to move out Thoreau's gray area and to act to preserve one of Stegner's refuges of sanity in their own lives.