Comments Regarding the Central WUCC Integrated Report
April, 2018

I have been concerned throughout the process that environmental issues were not being addressed. Now that they have been included in the Integrated Report, I remain concerned.

My concerns fall into two categories; the lack of adequate and up to date environmental and climate change information, and failing to acknowledge their importance.

While the report identifies higher temperatures, increased precipitation and droughts as problems, these are referenced without the full discussion they deserve. As an example I offer the following expected effects of climate change obtained from both the Land Trust Alliance's *Conservation in a Changing Climate*, and the USDA U.S. Forest Service Climate Change Resource Center.

- Surface water supply will be increasingly threatened by invasive species through species migration as temperatures rise.
- Open water, which is directly exposed to sunlight, is most dramatically affected. The 2014 National Climate Assessment reports that increasing air and water temperatures result in more intense precipitation and runoff. Intensified droughts can decrease river and lake water quality in many ways, including increases in sediment, nitrogen, and other pollutant loads.
- As temperatures rise, the oxygen concentration of water declines.
- Algal blooms may begin earlier in the season, and last longer into the fall.
- As air and water temperatures increase, evaporation also increases, which may alter ecosystems, making native species more susceptible to die-off from competition with invasive species and in some cases more at risk of disease.
- Climate change can change the timing and quantity of stream flows, the salinity of surface and ground water, and the character of riparian and upland vegetation.
- Anthropogenic factors such as water withdrawals, dam construction, species introductions, and habitat degradation are expected to exacerbate climate change impacts on warm water fauna.
- During droughts, groundwater recharge will decline as temperature increases and rainfall decreases.
- Increasing groundwater extraction will further deplete aquifers, placing additional strain on surface water resources
- Because aquatic habitats integrate upstream and upslope activities, and because we lack even basic knowledge about so many aquatic taxa, habitat protection and restoration efforts may be most effectively applied to whole ecosystems at watershed or even regional scales Solid understanding of a region's physical and biological processes will facilitate prioritizing habitat protection and restoration actions for maximum effectiveness.

- Managing ecosystems for maximum resiliency will favor species persistence in the face of climate change. Possible ways to address this:
  - Maintain natural hydrograph. Generally, more water is a system mean less susceptibility to extreme temperatures and desiccation by drought.
  - Maintain groundwater levels. Drainages with more groundwater inputs appear to be somewhat more resilient to climate change impacts.
  - Ensuring adequate flows will help ameliorate water quality issues
  - Rising temperatures dictate continued adherence to water quality standards and will be essential to maintaining native warm water fauna.

The report is not strong enough in recognizing that climate change is a scientific fact not a possibility. Sea level rise is not *likely* to occur, it is occurring and happening at a faster rate that was anticipated. Climate change is not an event that will happen in the future. Its effects are being experienced now and planning needs to recognize that.

The report uses the droughts of 1960's as the worst drought in history. But the worst is now the recent drought of 2016. Droughts in the future will be hotter, of longer duration, and more frequent. The characteristics of droughts in the past are not good predictors of the future.

An example of the kind of thinking in this report is the evaluation of the potential impact of developing a well field along the CT River. It concludes that since the river is already degraded and not appropriate for recreation or fishing, the impacts related to the wells would be minimal, making this an ideal place for well development. It's as if the waters are of poor quality so what we do to them won't matter. There is work being done to improve the quality of the CT River, as the MDC is quite aware. They are spending billions of dollars to do just that. Future decisions about developing a well field there needs to consider that the quality of the water in the CT River is likely to improve.

A plan is only as good as the information that goes into it. For this report to truly address environmental concerns it needs to start with accurate information and a belief that environmental information is important.

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