

Date: September 7, 2015

To: WSAC

From: Mark Mesiti-Miller

Re: Considerations for our Water Supply Portfolio

Summarized herein are some crucial considerations we must ponder as we discern the water future of our community. I present them now as it is time to deliberate the circumstances of our environment, consider the impact of our decision on the welfare of our ecosystem and arrive at a final recommendation for adoption by the City Council. While every member of the WSAC wants in-lieu and/or ASR using excess winter water flows to satisfy our needs, it is critical our final recommended portfolio solve the problem in as expeditious manner as is reasonably prudent. To do otherwise, would be irresponsible and put our community, our region and our environment at serious risk.

Some argue we are not facing a crisis by definition as there are no public health issues, no public safety issues, no local economic collapse, the Coho Salmon and Steelhead are not yet extinct, severe curtailments have not yet been imposed, etc. Others agree the signs of impending crisis are all around us and should we fail to take prudent action, a crisis as defined above will actually occur. Any proposal that might allow such a crisis to actually occur is an unacceptable approach to decision making and would, in fact, be evidence of abject failure to act in the best interests of the common good. Good public policy anticipates future hazards, minimizes the risk of damage and avoids crisis. Accordingly, providing a solution that reliably satisfies the needs of our community while caring for our environment and minimizing the risk of failure is the only responsible course of action.

Climate Change Crisis or has anyone noticed how hot it is getting around here

While some argue significant impacts from climate change are 50 years or more distant and therefore we have the luxury of “time” to explore solutions, the facts tell a different story. Consider the following:

- “NASA and NOAA scientists say the year 2014 ranks as Earth’s warmest since 1880, according to two separate analyses by NASA and National Oceanic and Atmospheric

Administration (NOAA) scientists. The 10 warmest years in the instrumental record, with the exception of 1998, have now occurred since 2000. This trend continues a long-term warming of the planet, according to an analysis of surface temperature measurements by scientists at NASA's Goddard Institute of Space Studies (GISS) in New York." Source: <http://www.arctic.noaa.gov/detect/global-temps.shtml>

- Closer to home, the NOAA National Climatic Data Center records indicates the annual mean temperature in CA has increased nearly 2°F since 1895 and since 2000 the decadal average temperature has been trending 1-2°F above the 20th century decadal average temperature. Source: <http://www.ncdc.noaa.gov/temp-and-precip/state-temps/>
- Even closer to home, EPA Climate Change Indicators show that since 1901, the average surface temperature across the contiguous 48 states has risen at an average rate of 0.13°F per decade or about 1.3°F per century. While a rise of 0.13°F per decade seems slow, average temperatures have risen more quickly since the late 1970s (0.26 to 0.43°F per decade). Even more alarming and as shown in Figure 3 of the referenced report, for our area of CA, the rate of temperature change since 1901 has ranged from 2.0 to 2.5 degrees per century – almost double the average for the contiguous states. Accordingly, it is reasonable to surmise that since the 1970's the average rate of change in our region has probably accelerated to the high side of 0.43°F per decade or 4.3°F per century. Source: Report from EPA - Climate Change Indicators in the US - June 2015 and attached hereto – item 1.
- Professor Gary Griggs recently advised: "2014 was the hottest year on record globally since we started keeping records 135 years ago, and the 9 of the 10 hottest years have all been since 2000 except 1998, which was an El Nino year. There are a lot of greenhouse gases in the atmosphere and many years ahead of continuing warming." For those who may not know Gary, Gary is a Distinguished Professor of Earth and Planetary Sciences and the Director Institute of Marine Sciences at UCSC.

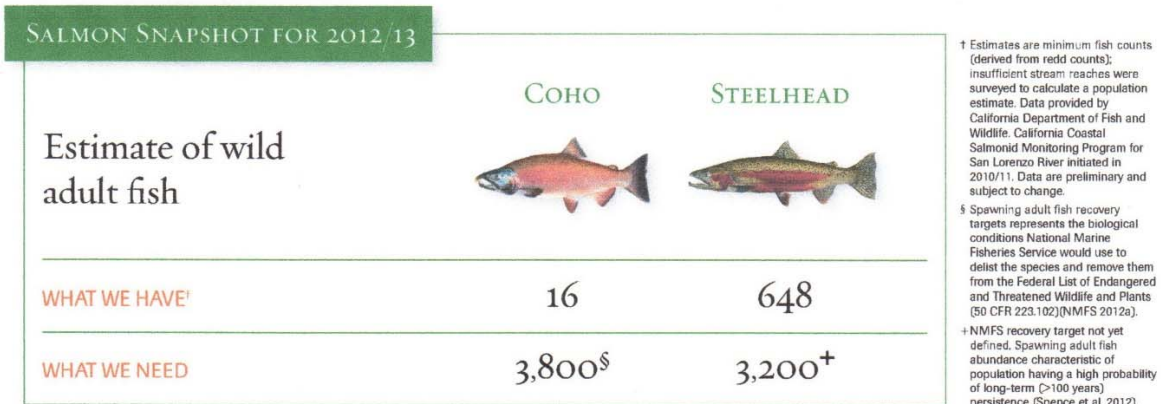
Fishery Crisis or will the native salmon and steelhead go extinct on our watch

While many reports concerning the health of our local streams and rivers are quite academic and difficult to decipher into layperson's language, I was able to find a few "plain language" documents upon which an objective analysis can be made and solid conclusions can be

reached. In addition, I have come across a few media reports which, hopefully, will allow us to learn from those around us. Two indisputable facts are clear: Coho Salmon are listed as an endangered species and steelhead are listed as a threatened species. Consider the following:

- Klamath River, OR - Biologists fear a repeat of the 2002 fish kill in the Klamath River when 62,000 salmon were killed. The worst thing is “no one really knows how much water is needed to avert a major fish kill, given the variables of how many fish return and how hot the weather gets”. Note 63,000 is about half of the expected return of 120,000. Source: attached PDF file titled “Media - Biologists fear repeat of 2002 salmon kill in Klamath River - SC Sentinel 2015 08 07”
- Columbia River, OR - Federal and state fisheries biologists say the warm water is lethal for the cold-water species and is wiping out at least half of this year's return of 500,000 fish. "We had a really big migration of sockeye," said Ritchie Graves of the National Oceanic and Atmospheric Administration. "The thing that really hurts is we're going to lose a majority of those fish." He said up to 80 percent of the population could ultimately perish. Source: attached PDF file titled “Media - Half of Columbia River sockeye salmon dying due to hot water - SC Sentinel”
- Butte Creek, CA - An interruption of part of a cooling water flow in Butte Creek in central CA led to the death of almost 15% of the native wild salmon population (277 of an estimated 2,000). Source: attached PDF file titled “Media - PG&E power plant shuts off water flow - killing salmon AP 2015 06 22”
- According to a local report dated January 2012 and authored by Kristen Kittleson, Fishery Resource Planner at the County of Santa Cruz, “...efforts should focus on increasing dry season streamflow, providing winter refuge habitat for juveniles through protection of instream large woody material and increase efforts for riparian and watershed protection...”. While addressing the other efforts mentioned is beyond the scope of our present task, addressing the first listed effort “increasing dry season streamflow” is clearly within our charge. Source: see attached report titled *2012 Summary Report on the Juvenile Salmonid and Stream Habitat Monitoring Program*.
- Sometimes a graphic image can summarize and convey information in a clear manner understandable by all. The Nature Conservancy has created such a tool they call the

“California Salmon Snapshot” for rivers in our state. Below is the most recent snapshot from their website for the San Lorenzo River:



While there are many factors affecting the survival of these two species, it is clear we hold in our hands the technical ability to promptly provide an adequate flow of water in our rivers and thereby unquestionably improving the chances these two species will survive. The only question is, do we have the political will to do what our conscience tells us we should?

Clearly, the salmonids are only the “canary in the coal mine” for our watersheds and clearly, we are not giving the fish what the scientists say they need to survive, much less flourish. That we were able to fill Loch Lomond to 83% of capacity this year and were only asked to curtail our water use 25% this year was accomplished on the backs of the fish. As Rosemary Menard recently pointed out, if we had met the DFG-5 flow requirements, we would have had to curtail our water use at least 50%. So after counting on the savings an aggressive conservation program will deliver in 15 to 20 years, what should we do?

Summary or what should we do?

First, recognize that while we all want excess winter water to be stored in our aquifers (an element one/two combination) and are hopeful it may close the gap, there is no guarantee this approach alone will actually solve our problem or can do so in a reasonable time frame. Accordingly, it is prudent and responsible to concurrently develop a rainfall independent element three solution that can be promptly brought on-line in the event the element one/two combo cannot meet our needs.

Second, it appears the probable performance of the element one/two combo can be determined within five years (by 2020) and therefore, element 3 should be ready for final design and construction in five years as well. This strategy will essentially guarantee our water system will deliver the water our community needs within 8 to 10 years (by 2025).

Third, given the lower cost and energy profile offered by DPR over Desal, DPR is the best element three presently available. To bring a DPR facility to the point it is ready to build in five years requires the \$5m of work tasks in lines 72 through 77 of the GANTT chart for element 3A begin promptly and be completed by 2020. If at the 5 year mark (2020), the element one/two combo will meet our needs by 2025, we can terminate any further development of a DPR facility and congratulate ourselves on not needing to spend the additional \$80m full implementation would require. On the other hand, if at the 5 year mark it turns out we need DPR, we can congratulate ourselves on our 3.5 year head start and rejoice that our water supply problem will be solved in another 3 years or so at less than half the cost of ASR.

With regards to the fact that no regulations yet exist for design and construction of a DPR facility in CA, there was a time not so long ago when there were no regulations for most everything we see in the built environment today. This fact did not make such things “illegal” it simply meant regulations had not yet been adopted. It should be noted the state of CA is in the process of developing such regulations and has made significant grant funding available to assist communities in developing such systems right now. Surely, funds would not be made available to design, permit and construct such facilities if they were, in fact, illegal.

Further, we should acknowledge that purified recycled water resulting from Advanced Treatment of waste water has been safely used by various municipal water systems in many parts of the world, the US and here in CA to augment their water supplies. In a report first published in 2013 and titled “Potable Reuse Treatment Trains throughout the World” authored by Daniel Gerrity, Brian Pecson, R. Shane Trussell, and R. Rhodes Trussell more than 20 potable reuse treatment trains currently in operation or under construction throughout the world are highlighted. One such system is the Montebello Forebay Groundwater Recharge Project in California. This system, which involves the spreading of disinfected tertiary effluent, is operated by the Sanitation Districts of Los Angeles County and the Water Replenishment District of Southern California and has been in operation since 1962. Long-term epidemiological studies were conducted to evaluate the safety of this system, and they identified no significant health impacts, such as adverse birth outcomes, cancer rates, mortality, and infectious disease, after nearly four decades of water consumption. Source: attached file titled “MMM Item 3 -Report - potable-reuse-treatment-trains-throughout-the-world by Gerrity Pecson Trussell etal”

Clearly, the time has come to act, to act prudently and expeditiously. We cannot wait 10, 20, 30 years to address the supply – demand gap, we don’t have the time. The responsible course of action is to move forward with parallel implementation now.