

From your perspective as a community leader in Northern Colorado, what is your key takeaway from today's session?

- The key takeaway session from my perspective today is how intertwined municipal water users are to the rest of the water system and in some cases how fragile the balance is. As a natural resources manager, I've always been an advocate for more efficiency as it relates to water usage (especially as it relates to ag water uses). But I've learned over the years and it's been solidified in WLL how important return flows are to downstream users and how integral the "waste" of one user benefits those downstream to use the same water multiple times before it leaves the state. Additionally, I'm always so impressed by the efficiency, creativity, and the use of gravity in wastewater treatment plants.
- It was really interesting to hear the perspective of several municipalities, all of various sizes and backgrounds. While I understand CBT is a significant source of water for the front range, I was a little surprised to hear the extent to which some municipalities depend on CBT for their primary source of water. It makes me very appreciative of the foresight that the leaders before us had when planning for and executing the CBT project. Without that, things on the east slope would be very different than they are today.
- The early municipalities had a big advantage in acquiring water and planning for growth, due to unencumbered land for storage and right of ways for delivery systems. As small towns grew, the dependencies of water supply, treatment, and delivery became intertwined with reliance on larger cities, and the creation of water districts to provide services. With community growth, it became imperative for city leaders to plan for their own water sources and infrastructure for processing and delivery. The need to control their own destiny has created an economy of scale regional partnerships, ie: NISP, to meet future growth.
- I had several takeaways from this session. First, I was struck by the diverse circumstances that local jurisdictions in Northern Colorado are in with regard to water supply. Some have a sufficient supply portfolio to accommodate anticipated growth for many years (Greeley and Ft. Collins). Others are approaching the end of their available supplies and are anxiously awaiting new supply projects like NISP (Evans and Windsor). Second, I was struck by the complexity of rate-setting in the face of rapid growth and how important it is for jurisdictions to "get it right" regarding their growth forecasts, rates and water supply procurement. Finally, I appreciate and will borrow the 4-pronged approach that Greeley is taking to its water master plan, including Demand Management and Conservation, Strengthening Infrastructure, Increasing Water Supply Acquisition, and Developing Firming Storage.
- My key takeaway from our November session was how important conservation is in our long term strategy for Colorado water, how dedicating resources to non-potable water can help us, and how scarily dependent so many of our fastest growing communities are on CBT.
- My key takeaway from this month's session was learning how water managers that work for various municipalities determine how to safely forecast or plan for water shortages in a given year as to how much that municipality may need to sustain the residents of that community.

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- I have a much greater understanding of the intricacies of supplying municipal water that is clean and available and why wastewater and stormwater management systems are critically important for return flows, reusing water in more sustainable ways and flood control. It is interesting how communities, like Greeley, developed a comprehensive potable and non-potable water supply and movement infrastructure that supports water conservation by using the appropriate water for the appropriate uses. It is a major conundrum for me that future water needs are based primarily on projected population growth, and yet projected population growth is based on access to more water – if you can't get the water, you can't grow. The assumption seems to be that unlimited growth is the only way forward for economic prosperity and community health and vitality. However, in the face of climate change and limits to our state and region's carrying capacity, a compelling case needs to be made for a fundamentally different assumption – a more sustainable model. While we are making progress, there remains a serious disconnect between land and water use. With growth, water use is not linear – there are changes in demand patterns.
- My main take away from the November 20th session is that municipalities are in different places when it comes to being prepared for their future water needs. Smaller municipalities like Wellington and Evans are in difficult positions in regards to growth and having enough water to meet the growth in their areas. Water is going to drive up the price of homes and some growth may be inhibited by the lack of water for certain areas. Cities like Fort Collins, Loveland, and Greeley have been planning and preparing for their water futures. They may be in better positions but still need to look at the long term picture. I think more needs to be done to plan regionally and have the difficult conversations about what else we need to do to decrease our water consumption.
- I had two takeaways. One was that NISP is critically important to the smaller communities with newer water rights and very important even to those municipalities with more senior water rights. We heard Shane from Windsor say, "There is no Plan B" if NISP doesn't come through. Evans has had to reduce its number of shares in NISP (1600 down to 1200, if I heard correctly) because they can't afford it. This leads me to the second takeaway which is that it seems there is really a circumstance of haves and have nots in the Northern Colorado water scene. I suppose it is always thus, but I was struck by how the smaller and/or newer towns may not be able to grow because of their lack of water resources. At the same time, the bigger and/or older towns will be able to continue to grow. Since Northern Colorado is expected to double in population by 2050, I am concerned about what will happen to the small towns.
- I am encouraged to see how much municipal conservation programs are reducing water demand and that this is happening across water suppliers. I also learned that every supplier is actively planning to expand their supplies to accommodate what they see as inevitable rapid population growth. They realize the importance of having a diversity of sources as they do so. They are taking cash in lieu of dedicating water rights not only to ease the burden on developers of finding water but to accumulate the money needed to develop more water resources. Municipalities are becoming majority owners of local irrigation companies to prepare for population growth, renting their current excess to farmers to keep farming. Eventually, municipalities will need this water and much farming will cease as a result.

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- Detailed planning and implementation of water delivery from multiple sources is needed to ensure the ability to adequately deliver potable water to customers. The system needs to be buffered to deal with water quality issues (wildland fire impact etc) and infrastructure interruptions. Increasingly separate non-potable water delivery systems are being considered to decrease and balance demand on water treatment facilities.
- After listening to all the different water providers explain their systems, it feels like there are two battles over water: 1. For supply/quantity, and 2. For quality. The first solution water suppliers seem to look to for providing high-quality water seems to be to take it from higher up in the watershed, and thereby reduce the cost for the treatment process, and reduce the cost water users might have to pay on their rates. However, the downstream habitat and flows are treated as a completely separate economic problem to justify providing water for. How do we make the big picture watershed health part of everyone's equation?
- Although most provider's (or suppliers to the general population and businesses) goal is to provide a sustainable supply at reasonable costs to their constituents, their direction and approach to solving the challenges are not entirely within their control. For example, Greeley is seemingly totally independent as their assets are not only an abundant raw water supply, but they also own their infrastructure for treatment and delivery. Evans at the other extreme appears totally dependent on Greeley for their supply, treatment, and delivery. Water districts, like the special districts that provide water to ag and municipalities seemingly have great control over how growth and business expand in certain areas and not to others. One of Windsor's solution is to require a non-pot system in order to be able expand it's potable supply for new development and to sustain their growth potential. The one approach to resolving some of the concerns was Lisa Darling and the South Metro Water Supply designed approach with multi water providers, treatment facilities and a cooperative effort (financing) for a major infrastructure system. That type of collaborative effort appears to be a benefit for all participants.

What questions do you have based on what you heard from today's speakers and group discussion?

- There are several regional providers that have included participation in NISP as part of their strategic water planning. It really highlights the importance of the project. If for some reason that project was delayed significantly, or not able to move forward, it would result in a significant detriment to the region. It seems that given the length of time it takes to go through the permitting process, we would be way too late to start the process for another water storage project. I feel like I have heard some discussion at both the federal and state level to try to make the permitting process a little more streamlined and efficient. Is there any information available related to that?
- How can water re-use policies be put into place to help meet the growing demand for water?; How can increased storage capacity projects help decrease the need for new water supplies by allowing jurisdictions to make full use of the water rights that they already have?; I would like to better understand the concepts of augmentation and return flow and how they impact a jurisdiction's water supply.; What is Evans' growth curve and how can we integrate water policies with smart growth management? It seems like there may be wide ranges for both supply and demand.; How can we help

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ensure that growth pays its own way, without making current rate-payers bear the brunt of sharply increasing costs to accommodate growth?; How can municipalities plan better and better understand all the complex factors related to water supply, storage, treatment and distribution that make up their cost of service so they can set rates appropriately?; What is the role of increased use and distribution of non-potable and re-used water on water supply management?; How can we significantly increase conservation and re-use given the constraints and quirks of Colorado water law—especially the use it or lose it provisions?; How much can water conservation and demand management be expected to reduce demand? Is the effect short-term and finite or can we continually innovate and improve our efforts?; What is a reverse-osmosis treatment system and why is it better at treating poor quality water than other treatment techniques?; How can we collaborate better on regional water policies given the diverse circumstances, values, and approaches to growth that are found in the various communities?

- A question I had after hearing from our last speaker was not only how she was able to get collaboration to happen after the drought was alleviated, but I assume it was necessary to get a tax to pay for the capital costs of their project. How were they able to educate the public to get on board to buy-in for the capital costs of their project after the drought was alleviated?
- A question I have after reflecting on this month's meeting would be to hear more on "Colorado's past legislation of water and how that caused the price of treated water to cost more now."
- Based on a review of my notes and the FC Rain Garden and WISE videos, I have lots of questions so perhaps I will need a water class tutor at some point, but here goes: Can we learn more about specific practices related to demand management and conservation?; Which city/town is doing what and can we somehow regionalize best practices?; What are equity partnerships?; How do we scale up water sharing/alternative transfer management agreements in northern Colorado and abandon buy and dry approaches to getting municipal water?; Is the size of Glade Reservoir related to a particular population growth model for the 13 entities that will directly benefit from the Poudre River water?; What considerations are in place for construction inflation costs and how this will impact water rates?; What happens if the people who live in places like Evans or elsewhere do want to pay such rates?; Water quality is better upstream and that is why Greeley has a Bellvue Water Plant and Fort Collins has the Soldier Canyon Filter Plant. Are there water quality technologies available to allow more Poudre River water to flow downstream to improve its health in Larimer County and reduce the miles of pipelines?; Are we considering a WISE Partnership for water re-use for northern Co?; Do we have reusable water rights on the Poudre River?; How are reusable water rights different from multiple-use water rights?; Can we learn more about developers' cash-in-lieu, development credits, water banks, equity buy-ins?; Is this how we require that growth pay its way?; Can we learn more about specific smart/responsible growth and land-use practices that integrate well with water use plans that emphasize water conservation and efficiency?; Why do some municipalities have dual water systems while others separate water and wastewater systems?
- What is Plan B for municipalities if NISP is delayed longer or hits some more barriers?; Obviously time is a factor, so what are Plan B and Plan C for each municipality?; What

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- are the municipalities doing to treat or remove microplastics from water?; Are they testing the rivers, streams, reservoirs, or treated water for these contaminants?; In regards to the Fort Collins water treatment facility: What happens to the water after it is treated and leaves the plant to the Fossil Rez?; Is it stored there or does it go downstream?; Who has a right to this water now and who gets to use it?; Do all cities have a similar plan or what do they do with the treated water after it leaves the plant?
- We briefly heard about Montava, the large housing development being planned near Anheuser Busch. What about metropolitan districts? How do they fit into this whole water puzzle?
 - Several speakers mentioned nanofiltration or reverse osmosis filtration, which I assume to be two names for the same thing. What is the opportunity in Northern Colorado to create more high-quality water out of lower quality resources by this method?; How much water currently is of too poor a quality to treat economically?; Why would anyone develop property, or regulators allow property to be sold, that depends on a well that has no source of replenishment, i.e. that has a water supply with a finite lifetime? A question from earlier classes: Though I think I understand how augmentation of a water right works conceptually, I would like to be taken through a real example step by step.
 - Questions on the impact on in-stream flows downstream of complex reuse systems as described by Lisa Darling for the South Metro Water Supply District: As these systems increase along the South Platte where portions of treated effluent continuously get recycled on stream reaches multiple times, will that ultimately lead to less water in the stream? If so what impact will that have on the riparian corridor, and how do we prevent habitat degradation negatively impacting the plant community, fish and wildlife?
 - I know that having someone on the Board of a water supply company for 20, 30, 40 years does provide a certain depth of knowledge about history and challenges for the entity, however, at what point is this hindering support for new leadership or new solutions to be brought forth?; How many total CBT shares are out there?; How do municipalities decide if they are going to offer cash-in-lieu for development water vs requiring developers to bring water first?; When communities are planning for their water needs, and looking for new sources, what would make them care about instream flows?; What is the emotional/economic benefit to them?
 - What does Northern Colorado need to do for the benefit of current residents and businesses as well as prospective newcomers to make it a sustainable and desirable area?

What did you learn today that encouraged you, discouraged you, or captured your attention to the extent that you could see yourself engaging in it further?

- I was both encouraged and concerned to learn more about Windsor's dual-system water systems in new neighborhoods. I applaud the splitting of potable and non-potable sources so as not to waste the treatment and transmission costs of treated water to irrigate landscapes. That said, in a follow-up conversation with the acting Water Resources Manager from the Town of Windsor I asked him about the risk of water groundwater resources being depleted in certain neighborhoods for these non-pot systems and he acknowledged it's a real concern. If a neighborhood with a non-pot system relied solely on wells for irrigation water (as my neighborhood does), and the groundwater levels dropped in a drought or over time such that it was no longer

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feasible to provide irrigation water, the HOA would have to deal with it on their own without the assistance from the town. There are HOAs in Fort Collins currently turning off zones to irrigation systems as they are overusing their tap allotment, and it is possibly a preview of neighborhoods in Windsor in the future as some of these non-pot systems that don't have redundancy begin to dry up. An additional unintended consequence of these systems (at least the one in my HOA) is that there is no incentivizing measure for water conservation. In my metro district, I pay \$305 annually to use as much water as I can dump on my lawn. While we are theoretically limited to three days a week between certain times, regularly I see sprinklers on multiple times a day, every day, thousands of gallons of water flowing down gutters nightly, and on and on. With no metering and economic incentivizing measure to prevent waste, overuse of groundwater resources may be exacerbated.

- I really enjoyed the Leadership Challenge talk with Lisa Darling. She has such a vast background in water so much positive enthusiasm on the subject. I was encouraged to hear about the WISE project and the initial development and conceptual planning of the South Platte Regional Opportunity Working Group (SPROWG). I am interested in collaborative efforts and the development of more reuse projects. While the SPROWG project seems very ambitious, it also sounds quite fascinating.
- I was encouraged that northern cities and water districts have prioritized the, "buy and leaseback" practices, ensuring active agriculture to continue for generations. Conservation numbers have doubled over the past years, reducing demand on existing systems. I was discouraged by the timeline for planning and implementation of storage, and infrastructure projects. This timeline creates scenarios of the best and most economical projects becoming prohibitively expensive and unsustainable, requiring changes and resubmission for the permitting process, for example, NISP start date 1980's. As demand increases, this time lag will create a roadblock for large projects, resulting in "near home" planning and build-out. The saying "how to do more with less" becomes the mantra for water. The delivery and processing of water provide the most benefit for cost and time. Increasing the treatment and flow type, potable and nonpotable water, allows cities to deliver a targeted product for specific and seasonal uses. Creating systems, that can recycle multiple times used water, can provide a large increase in supply. As the science and technology of repurposing advance, removal of pathogens and other harmful chemicals could produce a supply of potable water as pure as the original. The design and implementation of present-day systems, that are upgradable for further advances, become very engaging.
- I found it encouraging that CBT water can be used for multiple purposes without going through a change case but discouraging that it can only be used once. I am encouraged by the ways that conservation and demand management can help communities deal with their water supply issues. I am struck by the differences between municipalities that operate water systems and can tie land use and growth policies to water policies vs. water districts that have no land-use authority. I am discouraged by that disconnect. I am discouraged by the extremely high costs of infrastructure improvements and supply acquisition and how those costs lead to significant increases in utility budgets. What are the opportunity costs? What are we not funding because water and wastewater facilities are straining community resources? I am encouraged by the opportunities to learn from each other and to collaborate on water conservation programs. There is no

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reason for municipalities to reinvent the wheel in setting up their programs. I was surprised that more sophisticated reverse-osmosis processes to treat really poor quality water are projected to cost more than twice the cost of NISP water. I am encouraged that some municipalities like Windsor believe that they are setting water rates in such a way that growth will pay its own way. If they can do it, we can too. The realities of the current growth curves of up to 8% per year in some places, along with the forecasts that places like Windsor and Evans will likely double in population within the next 20 years are startling. We cannot focus primarily on water supply issues and miss opportunities to enhance conservation and demand management. The quote, "Look ahead and plan for others as others have planned for you" is inspiring, but daunting. It makes me even more committed to exploring ways to link water supply and demand management with land use and growth policies.

- What I learned today that discouraged me was how long it takes and how expensive it is to bring supplemental water sources on, yet how scarily dependent on having NISP our Northern Colorado communities are as I heard, "Growth will pay its way with NISP!"
- One of the topics of conversation from this month's meeting that captured my attention and was pretty interesting was how Greeley in the past bought farms that were in distress and is now leasing the land back to the farmer, owner, or current operator and now as a result owns the water from that farm that they can now treat for municipal use.
- I am encouraged that Loveland uses different growth projections to help guide its future water needs and would like to know if all the other jurisdictions in northern Colorado and throughout the state do the same. We are always referencing the state demographer's projections so I would like to know if she calculates population growth based on different assumptions and considers the factors that could influence these projections. I want to make sure that in Larimer County, we carefully consider the integration of water and land use as we update our land-use code. These issues and the questions raised are relevant to the NISP, Thornton, Halligan and Seamen deliberations that are unfolding.
- After leaving the tour at the Fort Collins treatment area, I looked at the Headwaters magazine and all of this sparked my interest to further explore reuse, treatment, and efficiencies of water use. I was discouraged at the impending water issues of the possibility of not having enough water to meet the growth that is coming and the doubling of our population. I see a winner vs loser, big town vs small town struggle in the future. I worry about those "poorer" communities that may struggle with enough water or water quality. I was encouraged by the rapport and relationships in the room and the common respect for each other.
- I thought it was interesting what Lisa Darling was saying that municipalities will have to show that they are using their water efficiently before the state would allow further trans-mountain diversions. She indicated there is a lot of room for improvement here. She and others referenced the American Water Works Association. Will we hear more about their work? We also heard about regional collaboration. Some in Northern Colorado said they thought it was a good idea. Is the February Forum convening for that? Also, Darling said the reason that WISE worked was because there was no asset transfer. Could we get regional collaboration here with no asset transfer? Or is there openness to other ways of collaborating?

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- I was encouraged by the increasing adoption of non-potable irrigation systems. I'm proud that the night before our class the FCLWD adopted a "conservation tap" fee schedule to reduce the indoor water resource fee for properties with non-potable outdoor irrigation but don't know how, given the many political jurisdictions we cover and that the majority of our territory is already developed, we could provide non-potable irrigation water. I was discouraged that no government or utility officials are questioning the inevitability of population growth in their communities. They don't seem to see the irony of executing policies to promote growth while remarking about how this "inevitable" growth challenges their water supplies. I have heard a slogan whose three parts each deserve careful consideration: growth, beyond a certain point, is neither sustainable, desirable, nor inevitable. Maybe the counter slogan of "grow or die" is incorrect and what are perceived to be the necessary results of growth are really the results of rejuvenation, which can happen without increasing size. As community leaders, we need to be cognizant of how much we are inconveniencing or changing the lifestyles of our existing residents to accommodate more new residents, if our obligations to new residents even outweigh our obligations to the existing residents who elected us. Maybe if all the incremental costs were borne by new residents, market forces would naturally limit our population size and water demand.
- I was encouraged by using the South Metro example of recirculating water along stream reaches. Could that concept also be used to benefit the riparian corridor? For instance, could recirculating effluent water be used to wet significantly sized stretches of rivers that are currently depleted or dried up? In that scenario could effluent be used in a serious manner, rather than the small experiments to date in facilitated wetland systems, to be used in tertiary treatment on a large scale that would also create/enhance meaningful wetlands and riparian habitat and augment recharge along our stream corridors? I was discouraged by the ever-increasing human demand for water juxtaposed with very finite water availability. Even with creative uses and conservation, the two trends are in serious conflict, and staving off and recognizing when the gap in water demand vs supply becomes the limiting factor for the Front Range and Colorado as a whole, it is truly just a matter of time, and we can only reinvent water so many times.
- It is discouraging to see how many communities have no Plan B if NISP doesn't work out. It also was concerning to hear people say "they don't have the stamina to start another water storage project if this one doesn't work out." It sounds like that's a problem related to the process. I think it is smart to be thorough and diligent with storage projects, however, making a change to the project's original footprint midway through the years of approval should be easier to find flexibility for in order to not have to start over. It sounds like some of the storage projects may have realized they don't need as much storage as they originally requested, but they don't have the "stamina" to go back to the beginning again. I am encouraged to hear how so many water users see that collaboration will be key to navigating the future of this precious resource.
- I think it is encouraging that there are people (governments and quasi-governmental as well) that can collaborate to solve these complex issues. The discouraging part is the length of time and dollars needed before any such agreements can come to fruition.