Meeting Summary

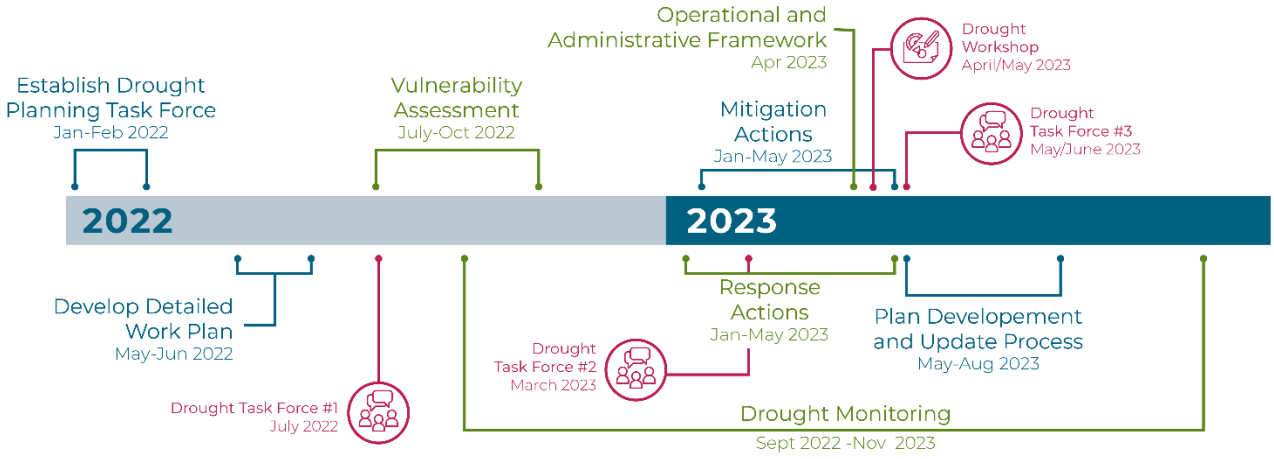
Project:	Upper Platte Drought Contingency Plan	
Subject:	Drought Task Force Meeting #2	
Date:	Wednesday, March 29, 2023	
Location:	Mid-Plains Community College – Ogallala Campus	
Attendees:	Scott Dicke, CNPPID	Joshua Neuffer, Bureau of Reclamation
	Tyler Thulin, CNPPID	Michael Ann Relka, Western Sugar Co-op
	Melissa Mosier, Audubon Great Plains	Rita Rutt, Producer
	Jared Derry, SPNRD/Producer	John Thorburn, Tri-Basin NRD
	Keith Koupal, Nebraska Game and Parks Commission	Ryan Reisdorff, South Platte NRD
	Larry Reynolds, Ag Producer	Galen Wittrock, South Platte NRD
	Jeff Shafer, NPPD	Kent O. Miller, Twin Platte NRD
	Dennis Schilz, Western Irrigation District	Joe Talich, City of Sidney
	Kevin Derry, SPNRD	Lyndon Vogt, CPNRD
	Thad Kuntz, ARI (representing NPNRD & SPNRD)	Jesse Mintken, CPNRD
	Phil Luebbert, JEO	Jennifer Schellpeper, NeDNR
	Stefan Remund, NeDNR	Elizabeth Esseks, NeDNR
	Avery Dresser, NeDNR	Caitlin Kingsley, NeDNR
	John Engel, HDR	Julie Molacek, HDR
	Paul Woodward, HDR	

The Central Platte Natural Resources District, North Platte Natural Resources District, South Platte Natural Resources District, Tri-Basin Natural Resources District, Twin Platte Natural Resources District (collectively, the Upper Platte Basin NRDs), and the Nebraska Department of Natural Resources (Department) gathered on March 29, 2023, for the second meeting of the Drought Task Force as part of the development of a Drought Contingency Plan for the Upper Platte River Basin in Nebraska.

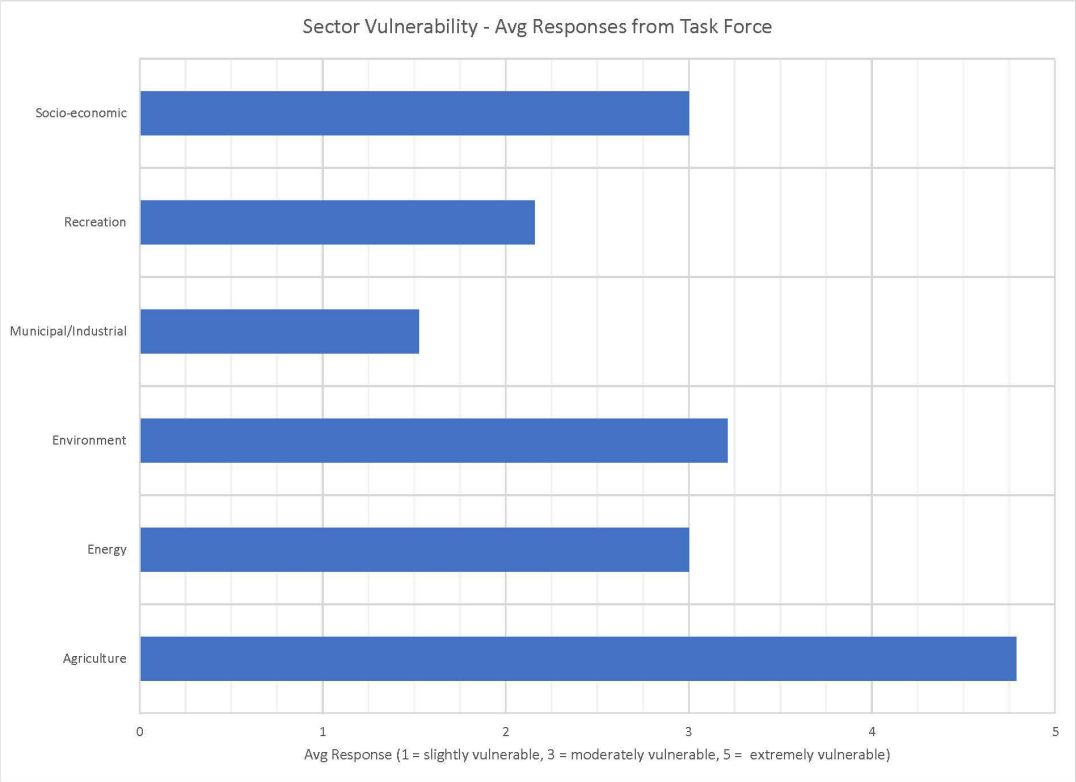
After a brief recap of the Drought Task Force kick-off meeting on July 21, 2022, attendees were presented with and discussed a variety of drought monitoring protocols, and then discussed vulnerabilities and potential mitigation actions in more depth, based on sector.

Review of Meeting 1

- The development of a Drought Contingency Plan for the basin was identified as a key element in achieving fully appropriated conditions during basin-wide Integrated Management Planning.
- The Platte Basin Coalition (consisting of the Central Platte NRD, North Platte NRD, South Platte NRD, Tri-Basin NRD, Twin Platte NRD, and the Department of Natural Resources) pursued and secured a WaterSMART grant from the Bureau of Reclamation. This grant will cover 50% of costs associated with the Plan development.
- The plan development process will consist of six main elements:
    - Establish diverse task force objectives.
    - Develop monitoring plan.
    - Conduct vulnerability assessment.
    - Identify mitigation & response actions.
    - Develop administrative framework.
    - Identify plan update process.
- The Drought Task Force, meeting today, is expected to:
    - Provide focused input to the plan development team.
    - Assist in the understanding of vulnerabilities and impacts of drought in the basin.
    - Provide input on potential mitigation and response actions.
- Updated project timeline:



During Meeting 1, participants filled out worksheets asking for their feedback on the vulnerability of different sectors. The below graphic illustrates the average responses received on those worksheets.



Participants in Meeting 1 were also asked for their input regarding the severity of impacts to each sector during short-term droughts (<6 months) versus long-term droughts. This feedback was presented to all participants. Later in the meeting, it was used as a starting point for breakout group discussions, assigned by sector (Agriculture, Energy/Municipal, Environmental/Recreation, Socio-Economic).

Drought Monitoring

Participants were presented with some examples of available drought monitoring tools and their potential applications, and they were asked for feedback on what data they would find useful moving forward.

- The purpose of drought monitoring tools is to provide a framework to predict the probability of a drought or to confirm an existing drought, and to identify and define drought stages.
- Drought monitoring would consist of the collection and analysis of water availability, precipitation, and other data.
- Drought is monitored using identified indicators (e.g., precipitation) or climate-based indices.

    - Drought indices are measures of anomalies, comparable across a large area and a long period time (30-year).
    - Drought indicators are physical measurements, such as soil moisture, reservoir storage, or snowpack.
    - Drought indices and indicators are NOT forecasts but can show the impacts of past droughts and can provide guidance when combined with soil moisture, reservoir levels, and weather forecasts.
- An example drought index is the Standardized Precipitation Index (SPI), which evaluates whether rainfall is above or below normal.
- The drought indices/indicators that were considered are listed in the table below:

Indicator	Description	Timeframe	Data Source
Standardized Precipitation Index (**SPI**)	Precipitation anomaly	1 to 96 months	National Drought Mitigation Center (UNL)
Standardized Precipitation Evapotranspiration Index (**SPEI**)	Precipitation minus evaporation anomaly	1 to 96 months	National Drought Mitigation Center (UNL)
Evaporative Demand Drought Index (**EDDI**)	Evaporation anomaly	1 to 12 months	NOAA Physical Scenarios Laboratory
Palmer Drought Severity Index (**PDSI**)	Precipitation minus evaporation including soil moisture capacity	Varies depending on soil	National Drought Mitigation Center (UNL)
Snow Depth and Content (**SWE**)	Maximum and average snowpack depth (NE) and SWE (WY and CO)	Monthly	NOAA National Centers for Environmental Information

- Drought indicator types **not considered**:
    - Soil Moisture
        - NRCS SCAN network is limited to two stations in the Upper Platte Basin.
        - Nebraska Mesonet system has more stations, but what continued Mesonet operation looks like is currently unclear. Mesonet data is presented online as “real-time,” but we may need access to past months.
    - Remote Sensing – Not being considered as an indicator because comparison to historical droughts is limited. Monitoring conditions with these technologies could be useful for filling in gaps between weather and climate stations.
- The HDR team compared drought impacts to drought indicators over the period of 1980 to 2020 (40 years). Key droughts that were analyzed:
    - 1989 to 1992
    - 2002 to 2006
    - 2012 to 2014

- Drought impacts considered:

Sector	Impact	Description	Data Source
Agriculture	Crop Yields	Change in crop yields from average	USDA National Agriculture Statistic Service
Energy (Demand)	Cooling Degree Days	Number of days and excess air temperature where air temperature > 65° F	NOAA National Centers for Environnemental Information
Energy (Production)	Annual River Flow Volume	Hydropower potential as daily flows	USGS/NeDNR
Environmental	Fire Risk: Number of Wildfires	Number of non-prescriptive fires	National Interagency Fire Center
Reservoir Levels	River Flow Volumes	Winter flows – Refill potential Summer flows – Demand potential	USGS/NeDNR
Water Quality	Summer River Flow Volume	River flows between April and September	USGS/NeDNR

- Next steps are to determine if there are other drought impacts to consider or other drought indicators/indices to consider, and to determine how monitoring could fit into existing operations and planning.
- The goal is to develop a continuum of monitoring.
    - Planning to develop a dashboard similar to the one developed for the Lower Platte River Drought Contingency Plan, using indices that this group identifies.

Questions/Discussion

- Where is soil infiltration taken from in terms of SPI/PDSI?
    - SPI just tracks rainfall - evaporation and infiltration are not considered.
    - PDSI is Precip+Evap+soil moisture retention. PDSI has the assumption of soil infiltration. Discussion leader doesn't think soil infiltration is directly measured but assumed based on soil properties and sometimes calibrated with historic data.
- Why were some of the indices not considered? Was it just due to data availability/they didn't go back far enough?
    - Team was selecting indices or indicators that have: 1) enough stations/measurement locations to represent differences in the basin; 2) long history (> 30 years) to demonstrate that data collection would likely continue in the future; 3) data is collected and provided to the public within a useful timeframe (e.g., 1 month between collection and publication)
    - Remote sensing products are relatively new, so there isn't enough data for correlative analysis.

- (In reference to the North Platte at WY-NE border graphics on slides 34-35) Attendees felt there might be better correlation between flow and Wyoming reservoir storage instead of snowpack. There could be a year with a high snowpack, but low reservoir levels, and there will not be good flow levels.
- (In reference to the South Platte at Roscoe Gage graphics on slides 36-37) Attendees found it surprising that it didn't correlate as much – there aren't the same kind of reservoirs in that area, but they do have the Colorado reservoirs to draw from.
- North and South Platte summer volume correlations
    - Intuition says maybe South Platte would correlate to SNOTEL better than North Platte, but the analysis shows the opposite.
        - Perhaps because of Colorado reservoir system/recharge projects?
    - North & South Platte correlations with reservoir storage?
        - Snowpack → reservoir releases → flow
- (In reference to the Platte River at Grand Island graphics on slides 38-39) Attendees noted that flows there are based on snowpack.
    - The group wondered if it would be more useful to go with releases from Lake McConaughy. Flow at Grand Island seems highly dependent on Lake McConaughy releases.
    - Noted that more storage water is used in Central Platte.
    - One attendee didn't see SNOTEL being helpful here – felt that it may correlate, but there seemed to be no good reason for it.
    - High flows at Grand Island are typically years that Lake McConaughy is full.
- Does SNOTEL just correlate well for the high flow events (flood events, as opposed to drought events)?
    - HDR is working on a tool that can help plot out if an area is skewed low or high.
- Can't just use reservoir storage as a gage – may be relying on that supply for a couple of years. Reservoirs can provide multiple years of drought protection. SNOTEL doesn't matter much if you have a reservoir that can supply 4-5 years.
    - Concern that SNOTEL would be more useful for wet years than dry years – does not seem like a good tool for drought monitoring.
- Some participants felt like the entire state should be metered, not just from Wyoming to Grand Island, in order to develop a bigger, better plan. Felt that until the state is monitored or metered, it isn't worthwhile or equitable to institute allocations. Doing so results in a vast difference in land value a few miles away (greater value for those areas without allocations).
    - Metered areas are micromanaged, the rest of the basin isn't monitored and can pump "unlimited" amounts of water.
- Consider Wyoming reservoir levels.
- Lake McConaughy can't fix all of Nebraska's problems.
- Bureau of Reclamation typically provides monthly reservoir release forecasts, but they aren't useful or accurate until around April. See North Platte River Basin Monthly Operating Plan (usbr.gov).

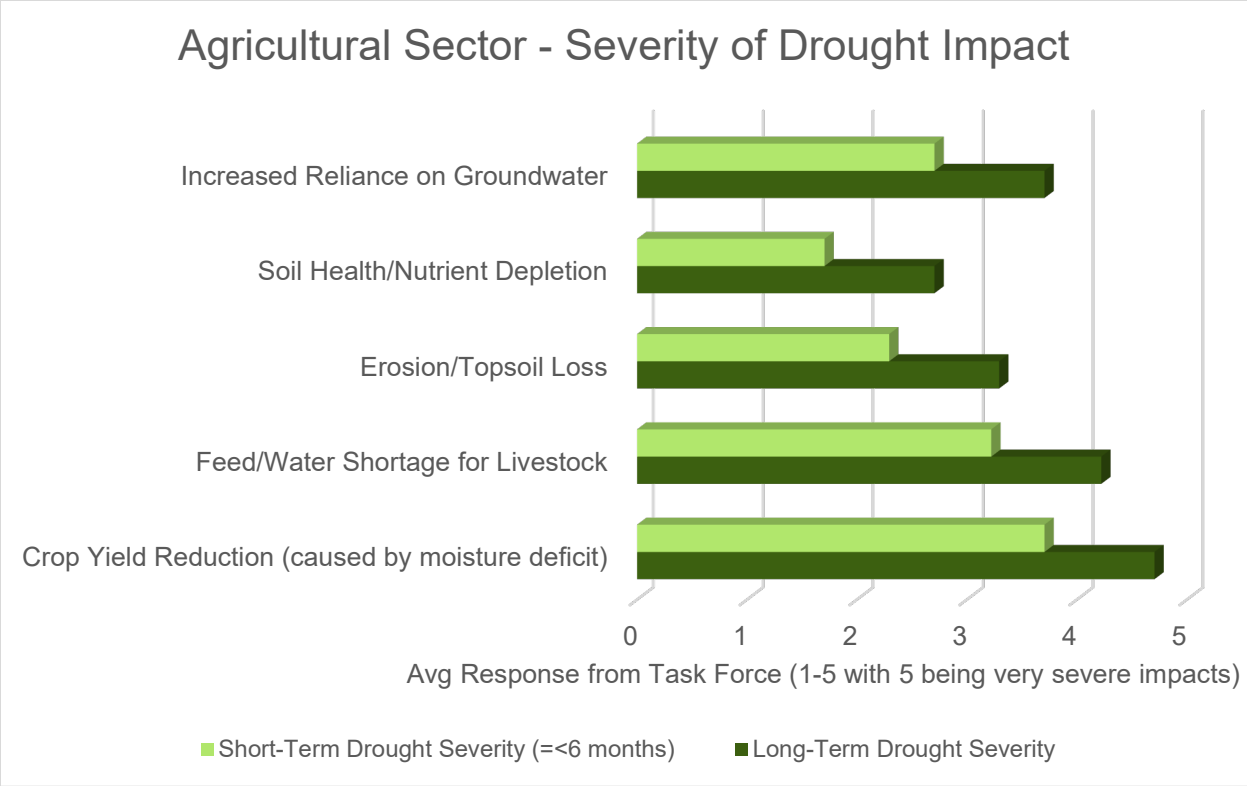
    - These forecasts provide probable minimum, maximum, and most likely reservoir inflows and storage for the upcoming year. Past examples of these forecasts are at: https://www.usbr.gov/gp/aop/np/npintpg.html
    - SNOTEL also isn't very useful until later March/early April.
- The Republican River Compact Administration (RRCA) model can estimate base flows into reservoirs. The model can predict 10-20 years in advance when irrigation water would no longer be available from a reservoir. Texas has a similar model. It can help predict and protect the life of reservoirs.
- Should look at when releases are being made (Summer? Or Winter) – consider whether this influences drought vulnerability.
- For fire concerns, currently looking at vegetative index, open to suggestions. Some atmospheric indicators (e.g., evaporative demand) might be an indicator of dryness/fire conditions.
    - NDVI
    - EDDI
    - Atmospheric indicators
- For power generation, the biggest drought indicator is Lake McConaughy storage level/reservoir levels. For power demand, there may be something else to look at.
- Are we looking at river health - dissolved oxygen or water temp?
- How are we supposed to understand the impacts of drought if we aren't able to monitor?
- Will this drought plan help emphasize the need for more data on drought? Can the drought plan justify creating more monitoring networks?
- Drought should be identified and responded to before planting and purchasing decisions are made; this will help farmers plan their season and avoid financial harm.
- Possibly combine drought indices with reservoir levels for drought monitoring purposes.

Vulnerability and Mitigation Action Discussions

Participants broke into 3 facilitated breakout groups to discuss sector vulnerabilities more in-depth, and to start discussing possible mitigation actions. The group then reconvened to discuss vulnerabilities and potential mitigation actions for the Socio-Economic sector, as that affects everyone.

Agriculture:

The agriculture breakout group consisted of approximately 13 people. The vulnerabilities that were identified for the Agricultural sector in Meeting 1 are shown in the figure below:



Discussions on Identified Vulnerabilities:

- NRDs' biggest concern is aquifer decline. We live in an area where our yields increase during drought – we get enough rainfall that we don't necessarily have groundwater declines. If you have years with drought, but enough water, you have a great yield.
    - Aquifer depletion (probably downstream of Lake McConaughy) is going to be a big concern.
    - North Platte - Aquifer responds very quickly/impacts can be felt very quickly, because it's so reliant on surface water flows – a decrease in streamflow is felt within weeks in this area. Concerned about increased reliance on groundwater supplies, depending on what is coming out of Wyoming. If surface water flow out of Wyoming decreases, and it's happening fast, there's a bigger draw on groundwater.
    - South Platte stream flows and canal flows mean nothing – all groundwater reliance.
    - Aquifer depletions are serious because it will interfere with domestic wells.
- Lodgepole Creek is lined with evaporation ponds taking 500-1000 gallons per minute out of streamflow. When you add up all the towns, how many gallons no longer go down the stream that used to?
- Above Lake McConaughy and below Lake McConaughy look very different. How many acres of the Upper Platte Basin don't rely on river flows?
- How we consider drought, it's about snowpack – if the snowpack isn't there, we're not getting water.

- Short-term drought doesn't have a big impact on irrigated land, but it does have a big impact on non-irrigated land. Around 10-15% (or less) is non-irrigated.
- Group participants chose to amend the Crop Yield Reduction vulnerability to "Crop Yield Reduction (Surface Water/Non-Irrigated land)"
- Group participants chose to add a vulnerability to the list: "Aquifer Depletion (Well Interference)"
- After prioritization activity, the group also decided to add Water Quality to the vulnerabilities list.

Participants were provided with 3 purple dots and 3 black dots. They were asked to place their purple dots next to the vulnerabilities they felt should be prioritized during a short-term drought and place their black dots next to the vulnerabilities they felt should be prioritized during a long-term drought. The top priorities are as follows:

Short-Term Drought

1) Crop Yield Reduction (Surface Water/Non-Irrigated land)
2) Feed/Water Shortage for Livestock
3) Increased Reliance on Groundwater

Long-Term Drought

1) Aquifer Depletion (Well Interference)
2) Crop Yield Reduction (Surface Water/Non-Irrigated Land)
3) Feed/Water Shortage for Livestock

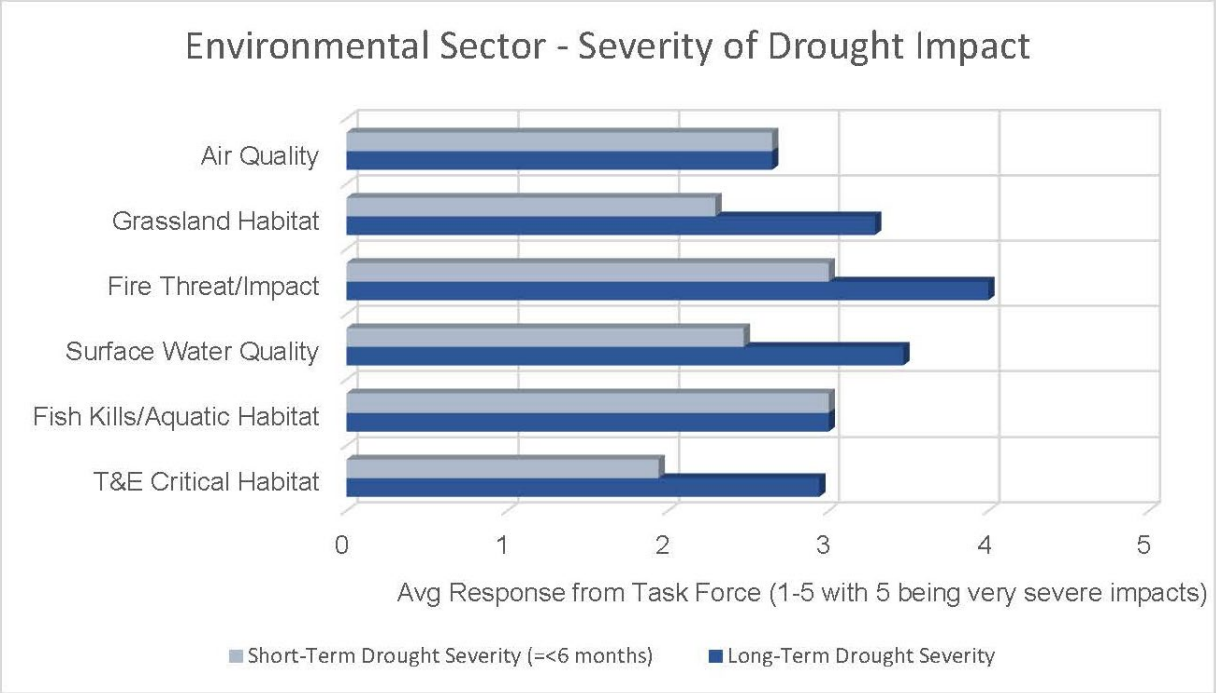
Discussions on Mitigation Actions:

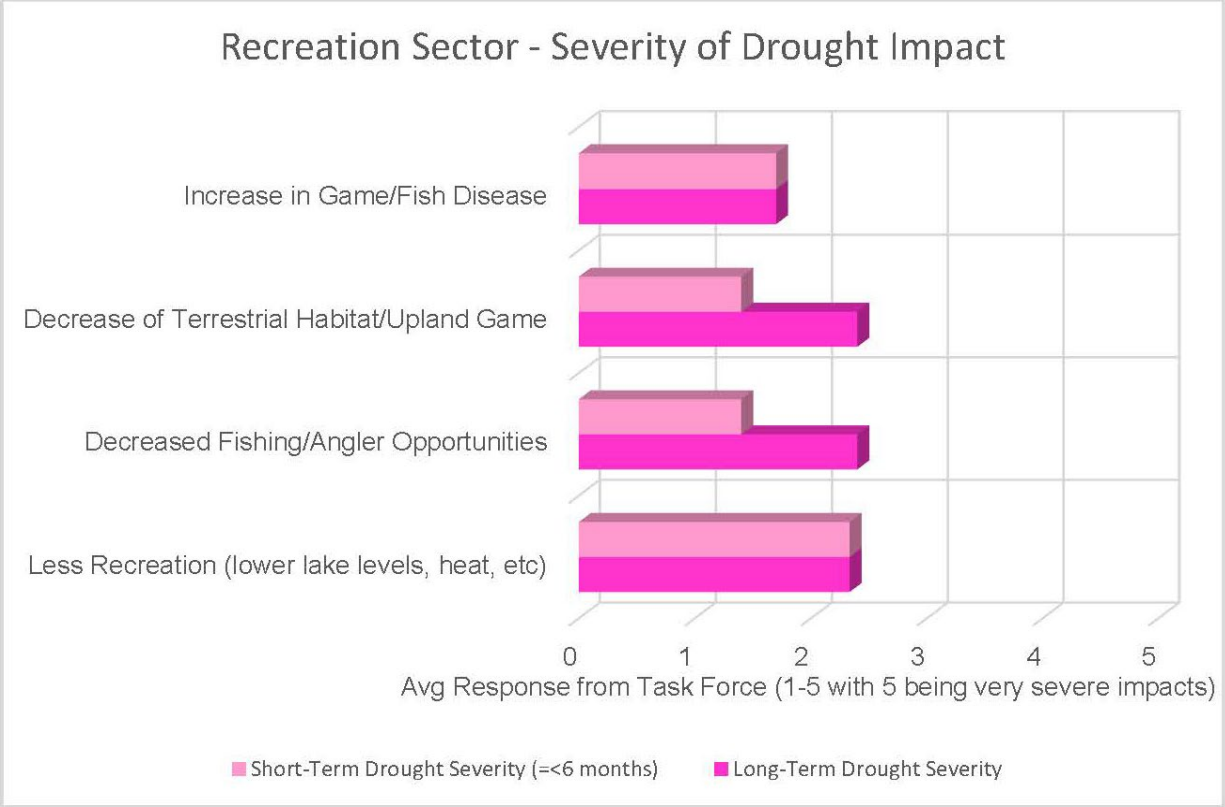
- Better predicting tools – if we can know earlier/in the spring if there's going to be a drought, we can plan for lower populations, changes of crops, etc.
- Some crop technology, seed varieties can do well in short-term drought, but not as well in long-term drought.
- On the livestock side, is it a question of better range management? Dependent on surface and groundwater/irrigation. In some areas, if there's no water, there's nowhere else to go. Pasture rotation isn't really an option.
- Is there anything that can be done in terms of emergency planning or NRD response actions? Water trucks, hay stores, etc.?
- In terms of long-term drought mitigation response, NRDs all have groundwater management plans, and that's what they move to eventually. If there is a decline below a certain amount an allocation is instated.
- Is there any difference in mitigation actions for crop yield reductions with short- and long-term drought?
    - Would be different above and below Lake McConaughy
    - Maybe having individuals plant/produce different crops that use less water (but pay less)

- Erosion will definitely be worse long-term. Conventional, tilled fields will start to blow during short-term droughts. No-till fields will start blowing during long-term.

Environmental/Recreation:

The Environmental/Recreation breakout group consisted of approximately 4 people. The vulnerabilities that were identified for the Environmental and Recreation sectors in meeting 1 are shown in the figures below:





Discussions on Identified Vulnerabilities:

- Is there anything missing from these lists?
    - Should add "Ecosystem Function" – repairing the ecosystem costs a lot. It's harder to fix than it is to prevent problems.
        - National forest and wetlands should be included in ecosystem function.
    - On surface water quality/fish kills – don't get too compartmentalized as everything is intertwined and has a culminating effect.
    - Want to prioritize and list specific issues withing each category by long- versus short-term.
    - Should update Less Recreation to specify "Less Aquatic Recreation."
    - Distribution of species and invasive species are both concerns.
    - Should add "Ecotourism Impacts."
    - Recommend combining "decreased fishing/angler opportunities" with "less aquatic recreation."
- Participants chose to add "Ecosystem Function" to the Environmental vulnerabilities list.
- Participants chose to add "Biodiversity & Species Distribution Changes" to the Environmental vulnerabilities list.
- Participants also noted that the two new vulnerabilities could potentially be combined as they are similar ideas.

Participants were provided with 6 purple dots and 6 black dots. They were asked to place 3 purple dots each next to the Environmental vulnerabilities and Recreation vulnerabilities they felt should be prioritized during a short-term drought. They were asked to place 3 black dots each next to the Environmental vulnerabilities and Recreation vulnerabilities they felt should be prioritized during a long-term drought. The top priorities are as follows:

<u>Environmental</u>

<u>Short-Term Drought</u>

1) Fish Kills/Aquatic Habitat
2) Fire Threat/Impact
3) Surface Water Quality
   (directly impacts fish kills/aquatic habitat)

<u>Long-Term Drought</u>

1) Biodiversity & Species Distribution Changes
2) Ecosystem Function
3)

<u>Recreation</u>

<u>Short-Term Drought</u>

1) Less Aquatic Recreation
2) Decreased Fishing/Angler Opportunities
   (Recommend combining #1 & 2 into the same vulnerability)
3) Ecotourism Impacts

<u>Long-Term Drought</u>

1) Ecotourism Impacts *(tie)*
1) Less Aquatic Recreation *(tie)*
3) Decrease of Terrestrial Habitat/Upland Game

- Participants noted that surface water quality decline directly leads to fish kills; the two vulnerabilities are linked.
- On the fish kills/aquatic habitat vulnerability, participants are more focused on aquatic habitat.
- Fire threat is a priority because it's still fresh on participants' minds. More cedars lead to increased fire risk.
- Drought doesn't just decrease recreation; it almost stops it. Short-term, there is a bigger financial impact. Long-term, you see some partners give up on those areas without water.

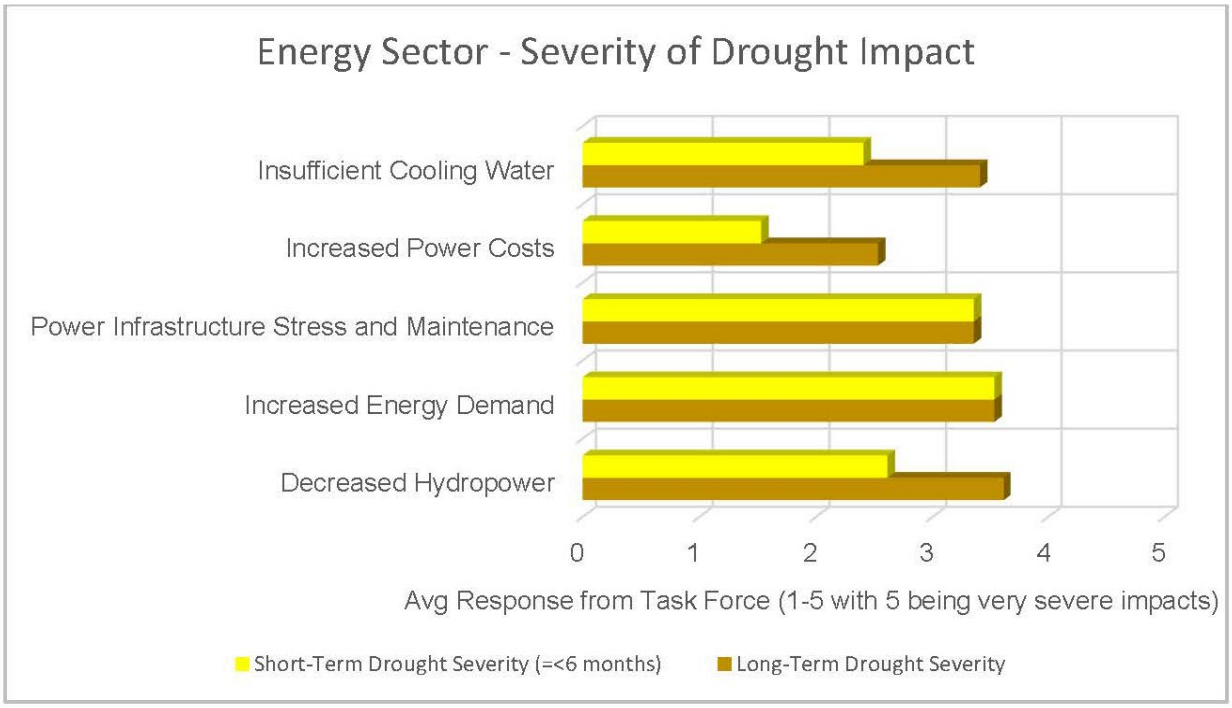
Discussions on Mitigation Actions:

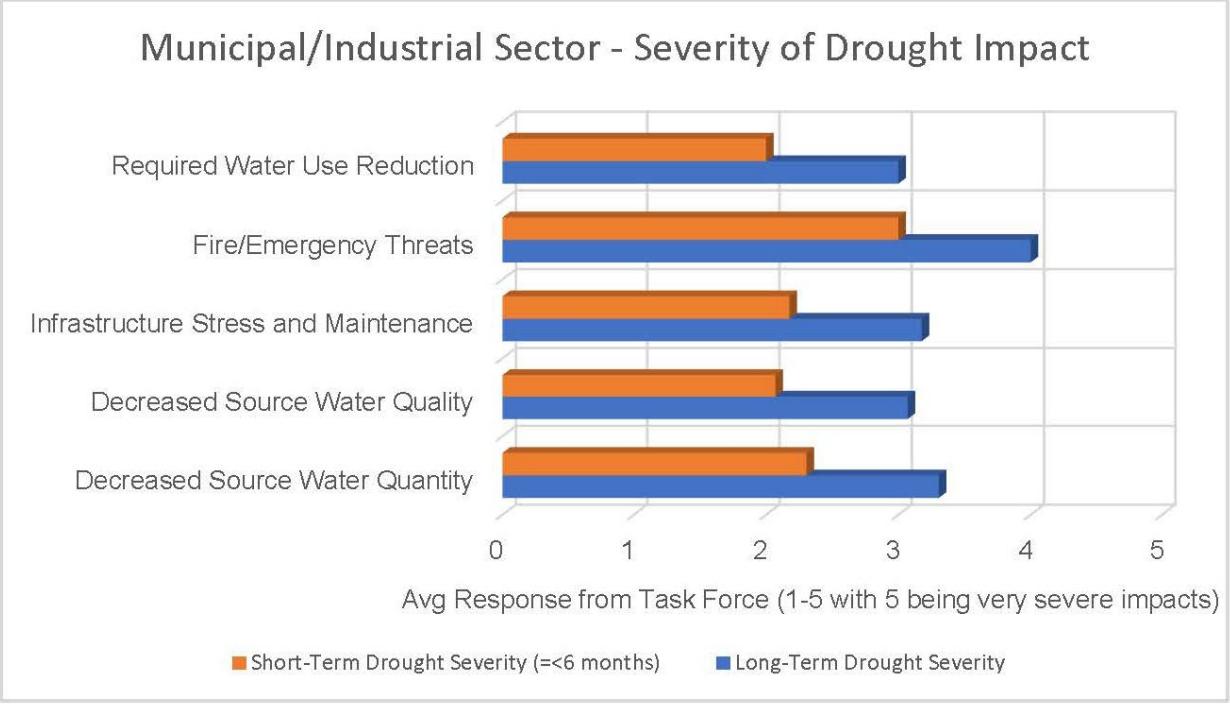
- Riparian zone buffers, allowing streams/rivers to meander and return to a more natural state. Additional protection and restoration.
- Control development and ag expansion in those riparian corridors.
    - RRCA groundwater model is looking at pumping impacts to riparian zones.
- Some mitigation actions are already in place to address aquatic recreation vulnerabilities.
    - Nebraska Game and Parks installs docks and moves them as needed.
    - Recreation is 'on the back' of power, etc.
    - Make changes to how you recreate – e.g., at Bonny reservoir (South Fork Republican River in Colorado) changes from larger reservoir to multiple small fishing ponds.
    - Rules and regulations may help with mitigation.

- Management of environmental flows to match species needs, and flexibility working with water rights.

Energy/Municipal & Industrial:

The Energy/Municipal & Industrial breakout group consisted of approximately 4 people. The vulnerabilities that were identified for the Energy and Municipal & Industrial sectors in meeting 1 are shown in the figures below:





- Energy production is based on what is in the Lake McConaughy reservoir. The level of the reservoir is how they plan for next year.
- Reduced revenue from sales of municipal water should be added to the vulnerabilities list for municipalities.
- Drying a canal during a drought can cause desiccation in the lining, and greater infiltration loss once it is re-flooded.
    - This is a long-term vulnerability for power infrastructure stress and maintenance.
- Load shedding is an example of a common response to increased power demand – to prevent damage and excessive stress on power infrastructure.
- Special emphasis on municipal water quality risks, especially since there are municipalities which are highly reliant on alluvial aquifers.
- Participants chose to add “Reduced Revenue” to the list of Municipal vulnerabilities.

Participants were provided with 6 purple dots and 6 black dots. They were asked to place 3 purple dots each next to the Energy vulnerabilities and Municipal & Industrial vulnerabilities they felt should be prioritized during a short-term drought. They were asked to place 3 black dots each next to the Energy vulnerabilities and Municipal & Industrial vulnerabilities they felt should be prioritized during a long-term drought. The top priorities are as follows:

<u>Energy</u>

<u>Short-Term Drought</u>

1) Increased Energy Demand
2) Increased Power Costs
3) Power Infrastructure Stress and Maintenance

<u>Municipal & Industrial</u>

<u>Short-Term Drought</u>

1) Fire/Emergency Threats
2) Infrastructure Stress and Maintenance *(tie)*
2) Required Water Use Reduction *(tie)*

Long-Term Drought
1) Insufficient Cooling Water
2) Decreased Hydropower
3) Power Infrastructure Stress and Maintenance

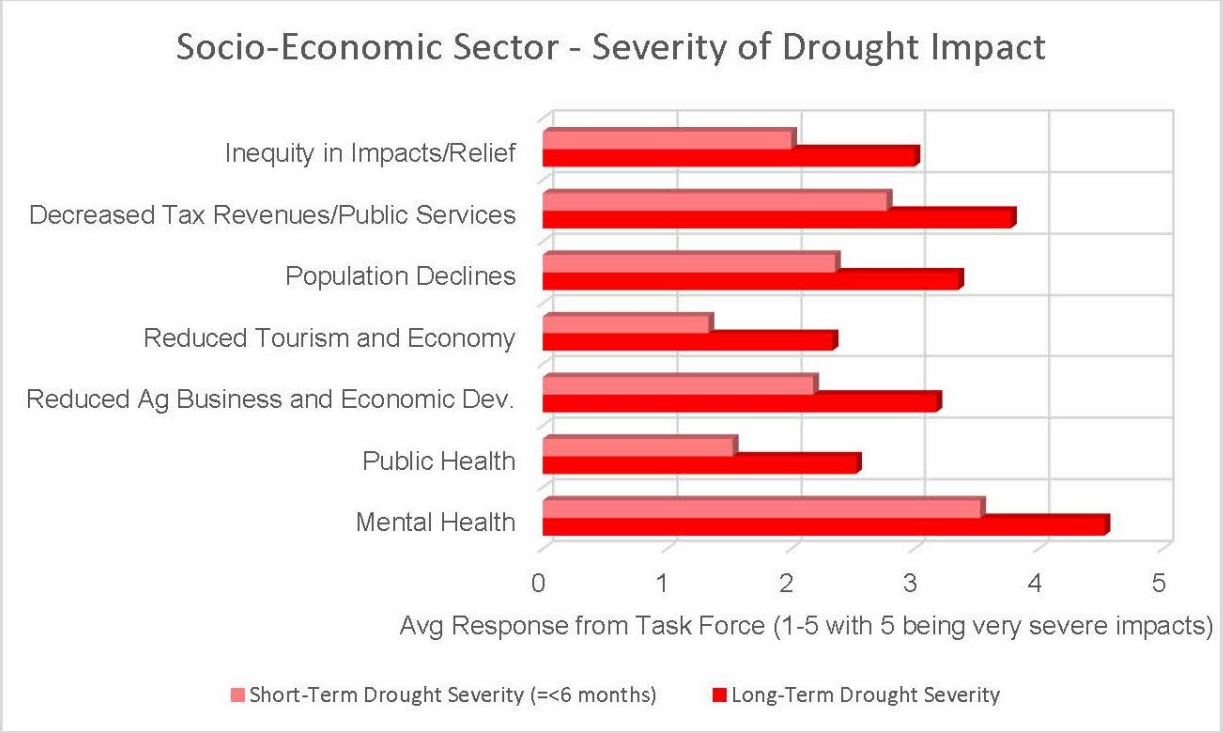
Long-Term Drought
1) Infrastructure Stress and Maintenance
2) Decreased Source Water **Quality** *(tie)*
2) Reduced Revenue *(tie)*

Discussions on Mitigation Actions:

- Use of Perkins County Canal and reservoir for power cooling water.
- Discussed diversion of excess flows (above a certain threshold) above Lake McConaughy for use as aquifer recharge.

Socio-Economic:

The full stakeholder group reconvened to discuss vulnerabilities and mitigation actions for the Socio-Economic sector. The vulnerabilities that were identified for the Socio-Economic sector in meeting 1 are shown in the figure below:



Participants were provided with 3 purple dots and 3 black dots. They were asked to place their purple dots next to the vulnerabilities they felt should be prioritized during a short-term drought and place their black dots next to the vulnerabilities they felt should be prioritized during a long-term drought. The top priorities are as follows:

Short-Term Drought

1) Reduced Ag Business and Economic Development
2) Inequity in Impacts/Relief
3) Mental Health

Long-Term Drought

1) Reduced Ag Business and Economic Development
2) Inequity in Impacts/Relief
3) Decreased Tax Revenues/Public Services

Discussions on Mitigation Actions:

- Perkins County Canal (additional storage) would be beneficial.
- In terms of the mental health strain – resources are available, lots of commercials encouraging people to reach out. The question is how to connect that to what's happening in a drought, or how to connect to what's already been developed, but apply it to drought.
    - Is there an awareness campaign that can be done through NRD newsletters, etc.?
    - Outreach through local health departments.
    - Dealing with heat stress.
    - Dealing with economic impacts.
- Public messaging through NRDs and Local Health Departments can increase awareness of the many already existing mental health resources that have been created.
- This sector is where all the other impacts combine and are felt.

Next Steps

- Developing some draft mitigation actions and response actions.
- Holding a drought tabletop workshop in April or May, will go over some potential drought scenarios and corresponding mitigation and response workshops.
- Plan to hold another Drought Task Force meeting in June.
- First draft of Plan is anticipated in the summer.