MINNESOTA POLLUTION CONTROL AGENCY

CLIMATE CHANGE RISK ASSESSMENT

Summary of Process and Data (abridged)

May 2019

Background

In 2018, the MPCA Climate Adaptation Team (MCAT) worked with management to develop a new MPCA strategic plan goal. From that process, MPCA management adopted the following goal in the Agency's 2018-2022 Strategic Plan:

"Act on opportunities to increase resilience of communities and the environment to climate change impacts."

It includes the following measures:

- Identifying Climate Adaptation Leads for each Program
- Including climate adaptation in Program Plans
- Assessing climate change risks
- Identifying opportunities to reduce risk
- Developing a Data Dashboard
- Taking action to reduce risk and increase resilience

Prior to beginning the risk assessment process, each Program reviewed some information about the climate change realities identified by the State's Climatology Office, which include:

- Minnesota is becoming warmer and wetter
- The state's lowest temperatures are warming fastest
- Extreme rainfall events are increasing

Process

With that grounding in mind, each Program followed a three-step process to assess climate change risks to their Program:

1. Brainstorming risks:
    a. to customers and stakeholders
    b. for staff and Program operations
    c. related to the adequacy of rules & regulations for the changing climate
    d. affecting the ability to make progress on the Program/Agency mission

    Then identifying broad themes for those risks (Workshop #1)

2. Independent assessment of the risks (completing ratings in the spreadsheet) – See Appendix 1 for example spreadsheet

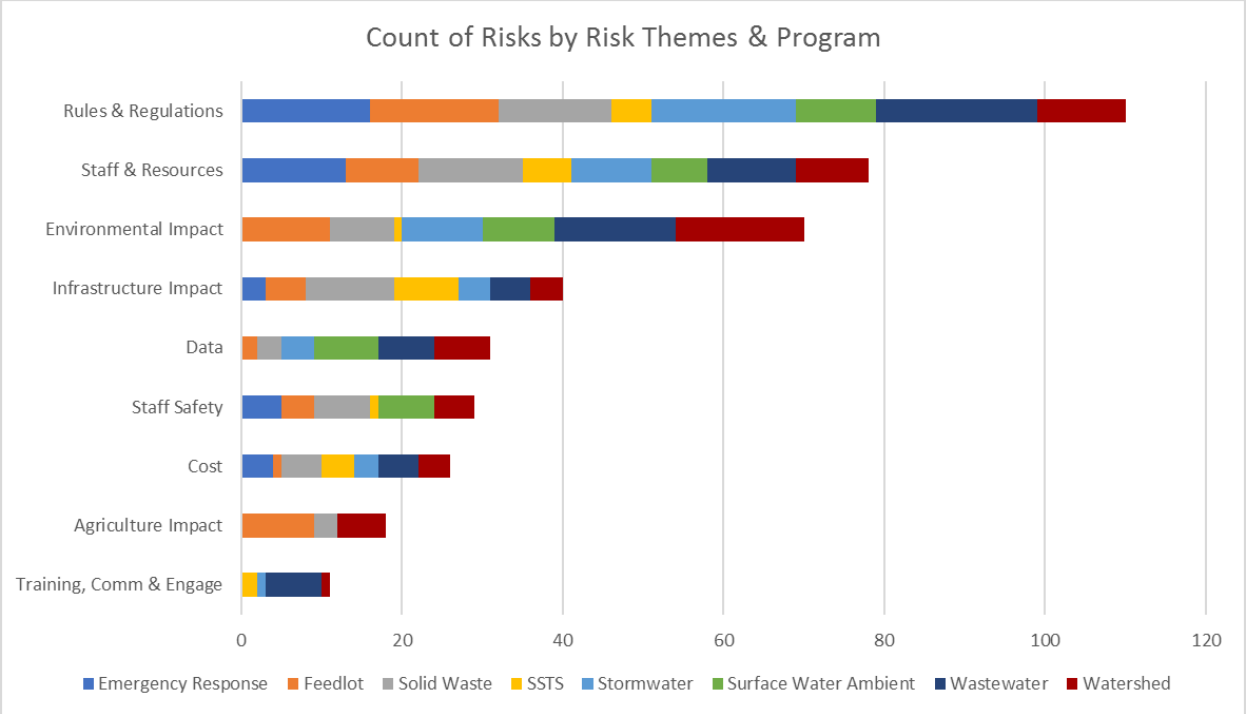
3. Reviewing the assessment data and identifying potential actions and benefits (Workshop #2) – See Appendix 2 for template used

The following MPCA Programs participated in this effort:

- Emergency Response
- Feedlot
- Solid Waste
- SSTS
- Stormwater
- Surface Water Ambient
- Wastewater
- Watershed

Themes

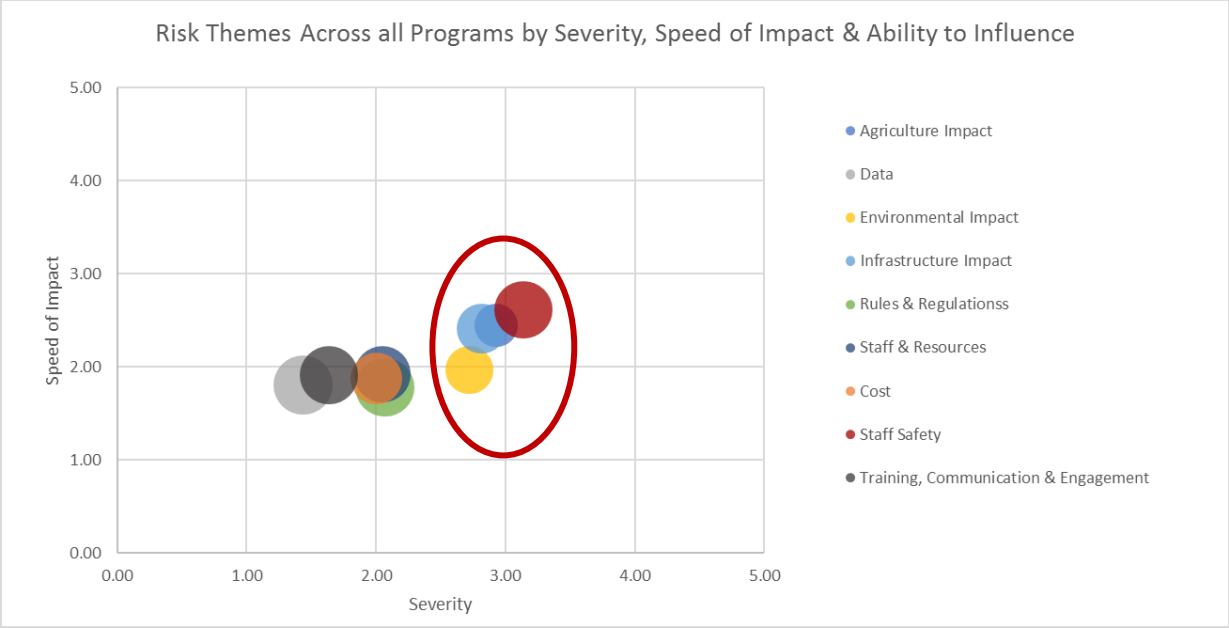
After all eight Programs completed their risk assessments, several themes emerged as consistent across many Programs. While the exact situation for each Program is slightly different, reviewing the collective information is beneficial to determine if there are areas where Agency-wide efforts may improve overall impact. A chart summarizing the count of Risks for each Risk Theme is shown below. The bar charts are stacked and contain the number of Risks for each Program in the respective Theme.



Risk Assessment Results

As the overall themes were considered, aggregating the data provided the opportunity not only to assess the number and types of the risks identified, but also to visualize the severity of the risk, and the Program's perception of the necessity of the speed of impact and response, as well as the Program's ability to influence the adaptations necessary to address the risks.

To support understanding the relationships between those pieces of information, a few charts were developed. The first chart below focuses on the severity (x-axis) related to the speed of the impact and needed response (y-axis) for each theme. The severity of any risk is a significant consideration. It can take many forms and is critical to consider when determining potential next steps. In addition, the speed of impact of the risk and response needed is important when prioritizing risks. The size of the bubble represents the ability to influence.



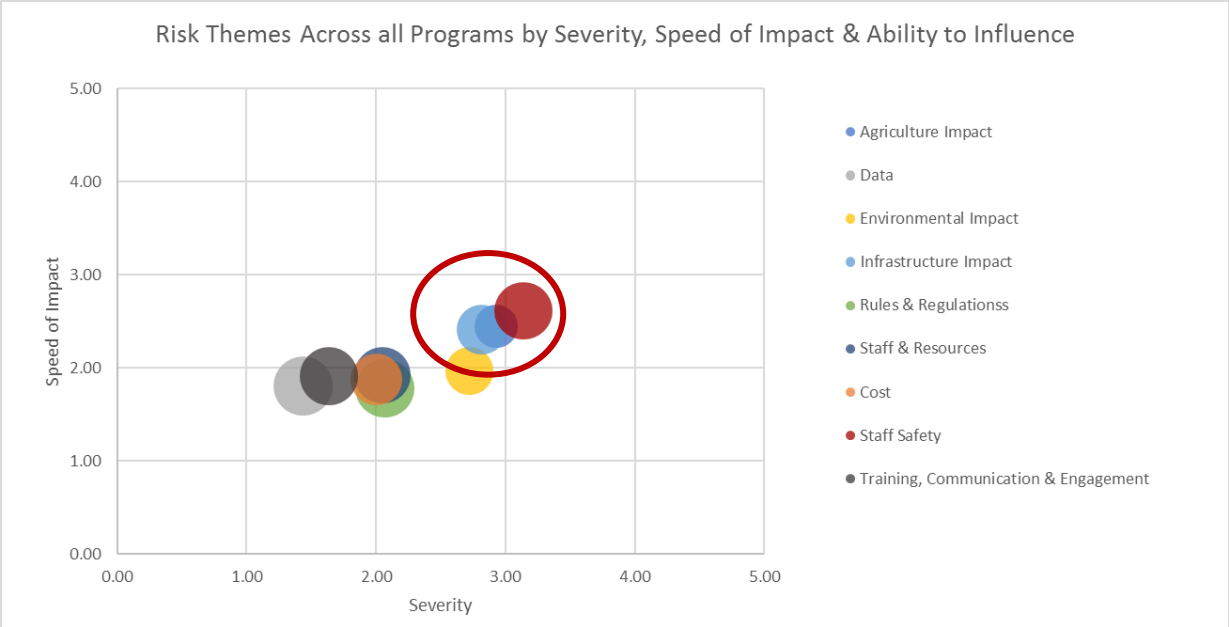
Aggregated across all Programs, four themes were ranked with the highest Severity (graph above):

- Staff Safety
- Agriculture Impact
- Infrastructure Impact
- Environmental Impact

Additionally, the Themes where the Speed of Impact and Response Needed was highest included:

- Staff Safety
- Agriculture Impact
- Infrastructure Impact

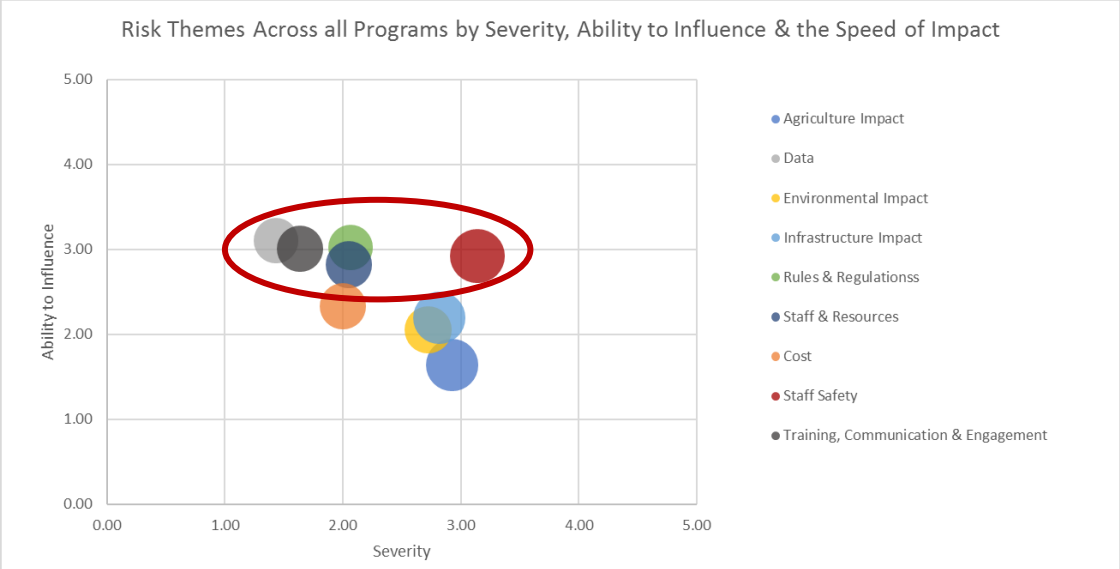
(See graph on next page)



The data also was analyzed with a focus in the chart below on severity (x-axis) in relationship to the Program's ability to influence any adaptations associated with the risks identified (y-axis) for each theme. This is particularly important information for the Programs as they consider what actions they can take and what they prioritize. The size of the bubble represents the speed of impact and response needed. Note that aside from staff safety, those themes which Programs have the most ability to influence are ones with less severity and lower speed of impact and needed response.

In terms of Ability to Influence (graph below) the highest rated risk themes were:

- Data
- Training, Communication & Engagement
- Rules & Regulations
- Staff Safety
- Staff & Resources



Appendix 1. Independent Assessment of Risks – Raw Data Example

Following is an example of the risk assessment raw data compiled from the spreadsheets filled out individually by participants in a Program risk assessment. Each Program was provided its specific spreadsheet (based on the risks its participants identified) and the raw data showing averages of participant ratings for each of those risks.

Severity
High: Significant Health Impact
Medium: Public/Private asset damage
Low: Daily impacts or gradual deterioration

Scope/Scale
High: Statewide affect
Medium: Multiple counties affected
Low: LGU affected

Speed of Impact & Response
High: Immediate
Medium: Short-term
Low: Gradual/Over Time

Ability to Influence Resolution
High: Completely within MPCA control to resolve
Medium: Resolve in conjunction with Stakeholders
Low: Little/No MPCA control

Rating Areas

Impacted Groups/Domains
(check all that apply)

ID	Risk	Severity (H, M, L)	Scope/Scale (H, M, L)	Speed of Impact & Response (H, M, L)	Ability to Influence Resolution (H, M, L)	Customers & Stakeholders (X)	Staff & Program Operations (X)	Rules, Regs & Certifications (X)	Program Mission (X)
R1	**Staff Safety**	3.4	3.9	3.4	4.1	0.6	1.0	0.0	0.3
R1a	Greater risk of drowning when monitoring	4.1	3.9	3.9	4.6	0.6	1.0	0.0	0.3
R1b	Increased contraction of new or existing insect-related illness	3.9	4.1	3.4	3.9	0.6	1.0	0.0	0.3
R1c	Increased frequency of heat related illnesses	3.0	3.9	3.4	3.9	0.6	1.0	0.0	0.2
R1d	Lack of or inadequate education/awareness of ice safety	3.0	3.9	3.2	4.1	0.7	1.0	0.0	0.2
R1e	Lack of or inadequate education/awareness of driving in storms	3.2	3.9	3.2	4.1	0.7	1.0	0.0	0.2
R2	**Limitations of Staff Resources and Response**	1.8	4.0	2.3	2.7	0.8	1.0	0.1	0.5
R2a	Lack of flexibility with staff to react to increased issues	1.9	4.1	2.3	3.0	0.9	1.0	0.1	0.6
R2b	Lack of cross agency discussion on how to handle the changes and who is doing what	1.4	4.1	2.3	3.4	0.9	1.0	0.1	0.6
R2c	Unclear/uncertain of priorities with water quality assessments - set priorities within program, watersheds and cross agency (is water quality top priority or safety or infrastructure)	1.7	4.6	2.1	3.7	0.6	1.0	0.2	0.7
R2d	Loss of roadway access so inability to respond to emergencies, maintenance or day to day travel	3.2	3.7	3.4	1.2	1.0	0.8	0.0	0.1
R2e	Loss of ability to do field work and monitoring - day to day or emergency	1.4	3.4	1.7	2.3	0.7	1.0	0.0	0.6
R2f	Lack of oversight of TMDL and water quality at LGU level if focused on invasive species and other issues	1.2	4.0	1.7	2.6	1.0	1.0	0.2	0.6
R3	**Equipment Problems**	2.1	3.9	2.3	3.3	0.7	1.0	0.1	0.5
R3a	Increased damage to or loss of monitoring equipment - cost to replace, may need to modify methods or equipment	2.6	3.7	2.8	3.4	0.9	1.0	0.1	0.6
R3b	Calibration or QA/QC may get out of date, increased frequent need for monitoring visits	1.7	3.9	2.1	3.2	0.7	1.0	0.1	0.4
R3c	Increased climate fluctuations damage equipment requiring creativity with replacements (need to be flexible in type of equipment, methods,	2.1	4.1	2.1	3.2	0.6	1.0	0.1	0.4
R4	**Insufficient Data**	1.8	4.1	2.0	3.2	0.7	1.0	0.5	0.8
R4a	Incomplete data collection (DOC, dissolved organic carbon, levels not necessarily monitored, sampled)	1.7	4.3	2.1	3.2	0.7	1.0	0.3	0.8
R4b	Data collection remains timeboxed rather than ongoing/continuous (data for air and water; may need to collect additional types of data)	1.7	3.9	1.9	3.7	0.7	1.0	0.3	0.8
R4c	Lacking budget to cover cost to monitor/test for standards if needs increase (shallow lakes that are impaired for nutrition not previously	1.7	3.7	1.9	3.2	0.8	1.0	0.7	0.8
R4d	Lack of understanding of climate affects on waters, like nutrient reductions	1.9	4.8	2.1	2.8	0.9	1.0	0.7	0.9
R4e	Incomplete or lack of sampling necessary to build database that will help tease out climate effects	1.7	4.8	2.1	3.0	0.7	1.0	0.6	0.8
R4f	Lack of understanding of watershed science (need adequate data and proper interpretation)	2.1	3.9	2.1	3.2	0.9	1.0	0.4	0.9
R4g	Inaccurate calibration and models requiring rework	1.8	3.6	2.0	3.6	0.7	0.9	0.3	0.6
R5	**Infrastructure Damage**	3.5	4.5	3.0	1.8	1.0	0.8	0.2	0.4
R5a	Continous rising water levels damage infrastructure	3.4	4.8	2.8	1.2	0.9	0.8	0.1	0.2
R5b	Storage infrastructure not adequate to handle increase	3.7	4.6	3.4	1.7	1.0	0.8	0.2	0.4
R5c	Flooding throughout growing season (no longer just spring)	3.9	4.6	2.8	1.2	0.9	0.8	0.1	0.4
R5d	Inadequate communication about bypasses, causing influx of questions	2.6	4.1	3.0	2.8	1.0	0.8	0.1	0.3
R5e	Waste water overflow as not built for the volume	3.9	4.3	3.0	2.1	1.0	0.8	0.4	0.3

Appendix 2. Ranking Themes, Identifying Potential Actions & Benefits

Following is an example of the template used for each Program to list its risk themes in priority order. Programs then identified potential actions to address the underlying risks and listed the value/benefits of taking each action. Each Program received a report which included the table as filled out during its Risk Assessment.

Priority	Theme	Action(s)	Value(s)
1	Theme 1	Theme 1 Action 1	Theme 1 Action 1 Value
		Theme 1 Action 2	Theme 1 Action 2 Value
		Theme 1 Action 3	Theme 1 Action 3 Value
2	Theme 2	Theme 2 Action 1	Theme 2 Action 1 Value
		Theme 2 Action 2	Theme 2 Action 2 Value
		Theme 2 Action 3	Theme 2 Action 3 Value
3	Theme 3	Theme 3 Action 1	Theme 3 Action 1 Value
		Theme 3 Action 2	Theme 3 Action 2 Value
		Theme 3 Action 3	Theme 3 Action 3 Value
4	Theme 4	Theme 4 Action 1	Theme 4 Action 1 Value
		Theme 4 Action 2	Theme 4 Action 2 Value
		Theme 4 Action 3	Theme 4 Action 3 Value
5	Theme 5	Theme 5 Action 1	Theme 5 Action 1 Value
		Theme 5 Action 2	Theme 5 Action 2 Value
		Theme 5 Action 3	Theme 5 Action 3 Value