SWSI Update Dashboard
Wireframe Addenda (ver. 1)

Prepared for CWCB *by* RS21
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Appendix A:

The following pages pull material from the originally proposed data visualization story list (Excel spreadsheet, sent by CWCB to RS21 in January 2019) and categorize the various story components into the proposed wireframe "Story Tabs." Additional notes and comments from other supporting materials are **noted in blue.**

SWSI Overview Page

PRIMARY TOPIC	STORY	DESIRED IMPACT	SCALE	VISUALIZATION	INTERFACE
Whole Shebang	Basins and BRTs (and IBCC?)	Explain the 9 BRTs and 8 basins	State Level		
Whole Shebang	SWSI 2010 and SWSI Now – The GAP	Explain the history of SWSI; where we've been and where we're at.	State Level		
Whole Shebang	Water Plan Goals	Explain the objective measures in the water plan	State Level		
Whole Shebang	What is Scenario Planning	Explain scenario planning, TAGs and CWP	State Level		
Whole Shebang	What is the Water Plan	Provide background on the Water Plan	State Level		

Methodology Page

PRIMARY TOPIC	STORY	DESIRED IMPACT	SCALE	VISUALIZATION	INTERFACE
Whole Shebang	Modeling Key Decisions	Explain modeling, development across basins and key decisions that were made in the models.			
Whole Shebang	Prior Appropriation	Explain (briefly) CO water law	State Level		

Dashboard Introduction Tab

PRIMARY TOPIC	STORY	DESIRED IMPACT	SCALE	VISUALIZATION	INTERFACE
Compacts	Colorado Compact	How the Colorado Compact works	State Level	–	Call–out
Compacts	Number of Compacts	Show the 9 compacts and 2 decrees by basin		Map with names	Clickable Map
Whole Shebang	How everything fits together	Explain how things are interconnected; values	State Level		

Dashboard Gaps Tab

PRIMARY TOPIC	STORY	DESIRED IMPACT	SCALE	VISUALIZATION	INTERFACE
AG	Efficiency	Where Ag is more and less efficient	County Level	Heat Map	Clickable Map
AG	Shortages / Gap	How Short SWSI shows Ag vs. Historical Shortage?	?	Graph?	Static Map
M&I	Conservation	Show gpcd; show how Denver Metro is more efficient (and has been)?	Basin level?	Map with numbers?	Static Map
M&I	Shortages / Gap	Were M&I may be hardest hit?	County?	Heat Map	Clickable Map
M&I	Water Loss	Areas with highest water loss?	City level	Graph?	Static Graph
TMD	Amount & Future	Show the number of TMDs and highlight the conceptual framework.	State Level	–	Call out
TMD	Shortage / Gap	What is the TMD Gap	State Level	Heat Map	Static Map

MISSING E&R DATA — HOW TO DISPLAY?

Dashboard Growth Factors Tab

PRIMARY TOPIC	STORY	DESIRED IMPACT	SCALE	VISUALIZATION	INTERFACE
AG	Buy & Dry	Show where buy and dry is likely to occur due to urbanization.	County Level	Heat Map	Clickable Map
Population	Population Shifts	Show shifts across Urban, Rural and Mtn Communities	County Level	Heat Map	Clickable Map
Population	Total Growth	Show how much Colorado is expected to grow.	County Level	Heat Map	Clickable Map
Population	Urbanization	Urbanization/assumptions in each scenario	County Level	Heat Map	Clickable Map

Dashboard Climate/Storage Tab

PRIMARY TOPIC	STORY	DESIRED IMPACT	SCALE	VISUALIZATION	INTERFACE
Climate	Paleo Comparison	Show why paleohydrology does not always make the best sense to forecast the future.	Basin Level	Graph	Static Graph
Climate	Timing & Storage	Show shift in in runoff?	State Level?	Graph?	Static Graph
Climate	ET Rates	Shifts in evapotranspiration (ET) rates? Demand needed to meet this shift?	Basin Level?	Map with numbers	Static Map
Storage	Development	Storage across the state and what could be developed?	Basin Level?	Heat Map	Clickable Map
Storage	Storage E&R Benefits	How storage can help E&R (rafting; fish; etc).	Basin Level	–	Call–out
Storage	Storage Volume	How small storage is compared to Lake Mead	State	Graph	Static Graph
Storage	Tanking Res for M&I	How you can drop a reservoir for consumptive uses but decrease resilience to long–term drought.	State	Graph	
Whole Shebang	How does storage work in CO?	Explain the need for storage	State Level		

Aquifers and groundwater vs surface water storage?

Why we need storage? Wet and dry years? Runoff?

Dashboard Solutions Tab

PRIMARY TOPIC	STORY	DESIRED IMPACT	SCALE	VISUALIZATION	INTERFACE
Projects (IPPs)	Where projects are at	Show were existing projects are located.	Map Level	Pins in a map	Clickable Map
XGAME – Get Involved	Join BRT – Plan Projects	Show how you can get involved and work to start a project in your area.	State + Basin		

"Driven by geography; Basins.

EX: Ag downstream of municipal needs water….part of the conservation story….map of where some of the water demands occur…"

Could include links to
– Basin Roundtable Page
– BIPs
– IPP project map
– CWCB Funded Projects
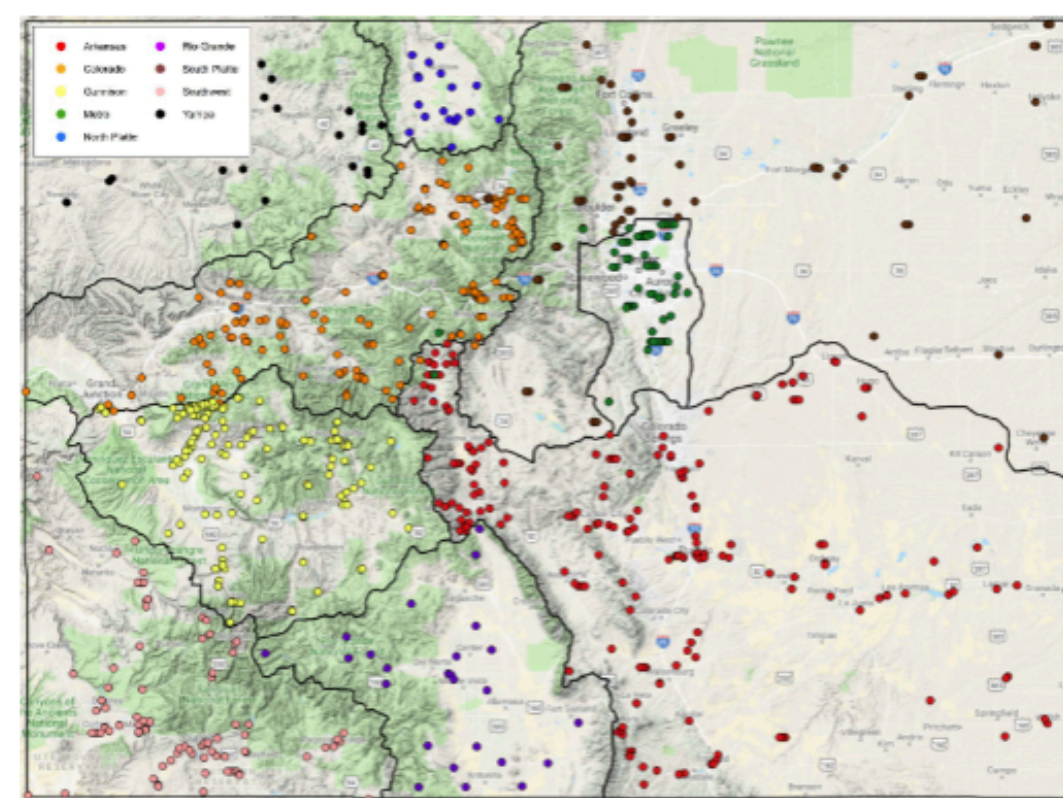**– SWSI/Water Plan Communications Tool Kit**

Figure 5. Statewide map of IPPs shown with basin boundaries.

Appendix B:

The following notes/questions indicate areas of the wireframes where we still feel like there are content/functionality challenges left to resolve.

Screen 1: Questions

1) What should we show as a default view? If no scenario is seelected, do we have a default visual to display on the map? Does the introduction need a map view?

2) What is the critical information we need to communicate about the scenarios? Should scenario information be persistent (i.e. always visible) or should it be referenced through a separate view/modal? Is there a need for cross-scenario comparison, or would an in-depth view of scenario assumptions be more appropriate?

3) What is CWCB's preferred strategy for encoding positive/negative value statements within these visualizations? For example, high "needs" implies less available water, whereas high "social values" leads to more available water. Using the same encoding scheme would cause conflicting visuals.

| Baseline | A | B | C | D | E |

Scenario D: Adaptive Innovation

| Economy/Population | HIGH* | New Water Efficiencies | HIGH |
Urban Land Use	DENSE	Social/Environmental Values	HIGH
Climate Status/Water Supply	HOT/DRY	Regulatory Constraints	INCREASED
Energy Water Needs	LOW	M&I Water Demands	HIGH
Agricultural Conditions	S. HIGH		

denotes adjusted value

Option 1: Provide detailed scenario information

Persistent scenario selection panel will allow visitors to the site to learn more about all of the various assumptions associated with each scenario, but limits ability to compare assumptions between scenarios.

Scenarios

LOW SUPPLY IMPACT HIGH	A	B	C	D	E
Water Supply					
Climate Status					
Social Values					
Agricultural Needs					
M&SSI Needs					

Option 2: Provide high-level scenario comparison

Persistent scenario selection panel will allow visitors to the site to compare general scenario assumptions, but will require additional details to be provided at other locations within the site (either on a separate page or through a conceal/reveal pattern).
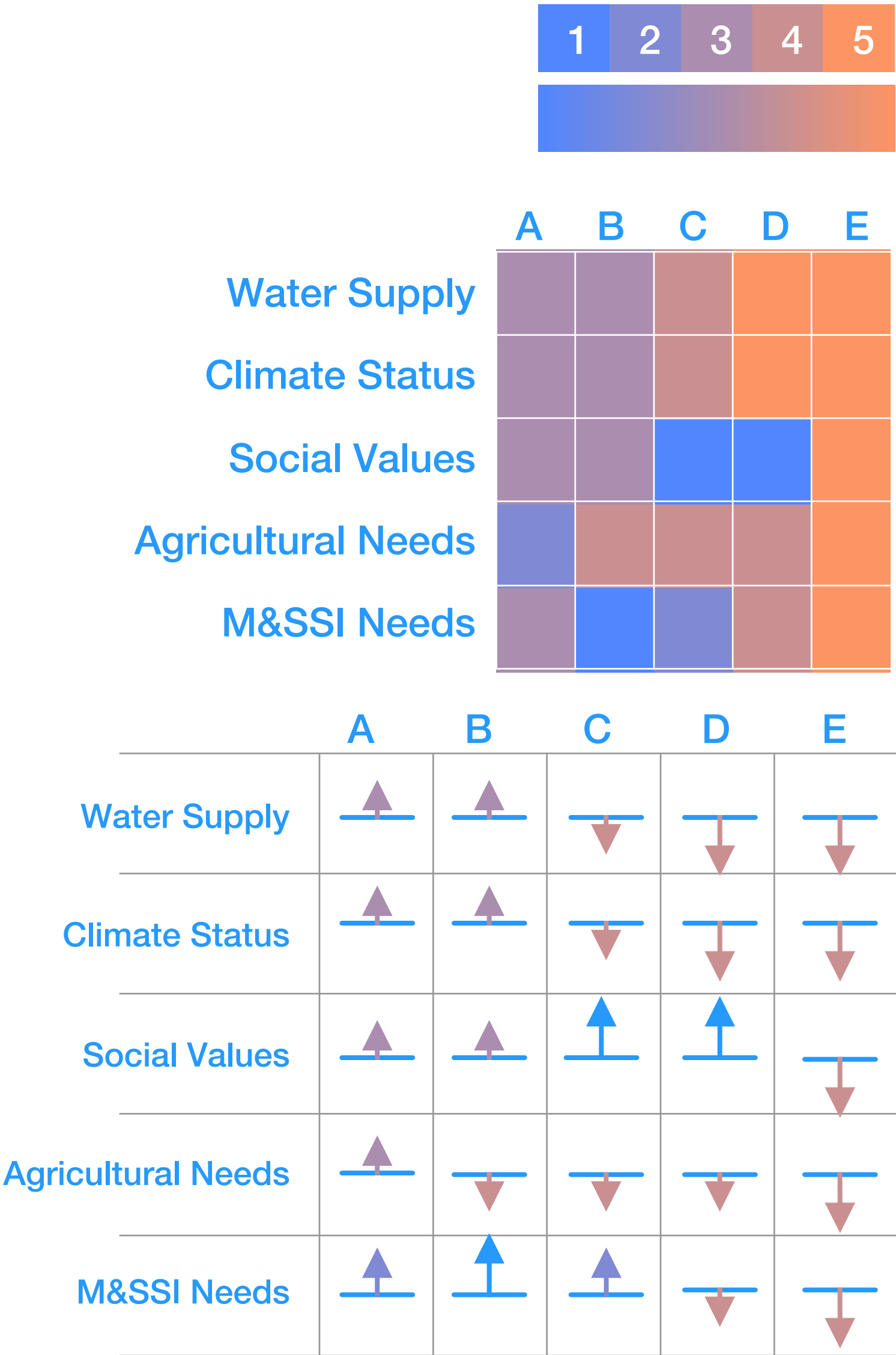
Screen 2: Questions

1) Do we have geospatial information associated with each story to be displayed in the story tab?

2) Does each story correlate with a scenario, or do we have stories to display that are not associated with the model output scenarios?

Screen 3: Questions

1) Do we have data to display on a map beyond a basin level? If not, is it useful to have the map zoom to the basin level (potentially allowing for city/ infrastructure location POIs) or should sector selection be fixed at the statewide view (potentially allowing for cross-basin comparison).

Challenge: Multiple stories/map display

Unless we choose to highlight one specific map view tied to each tab within the screen, there is a significant challenge in identifying which "heatmap" or other series of map layers should be displayed on the screen at any given time. In order to address this challenge, one possible solution is to use some sort of paginated layout *within* the story tabs. However, this solution presents a number of additional challenges, particularly in terms of overall complexity and a challenge for future responsive design opportunities.
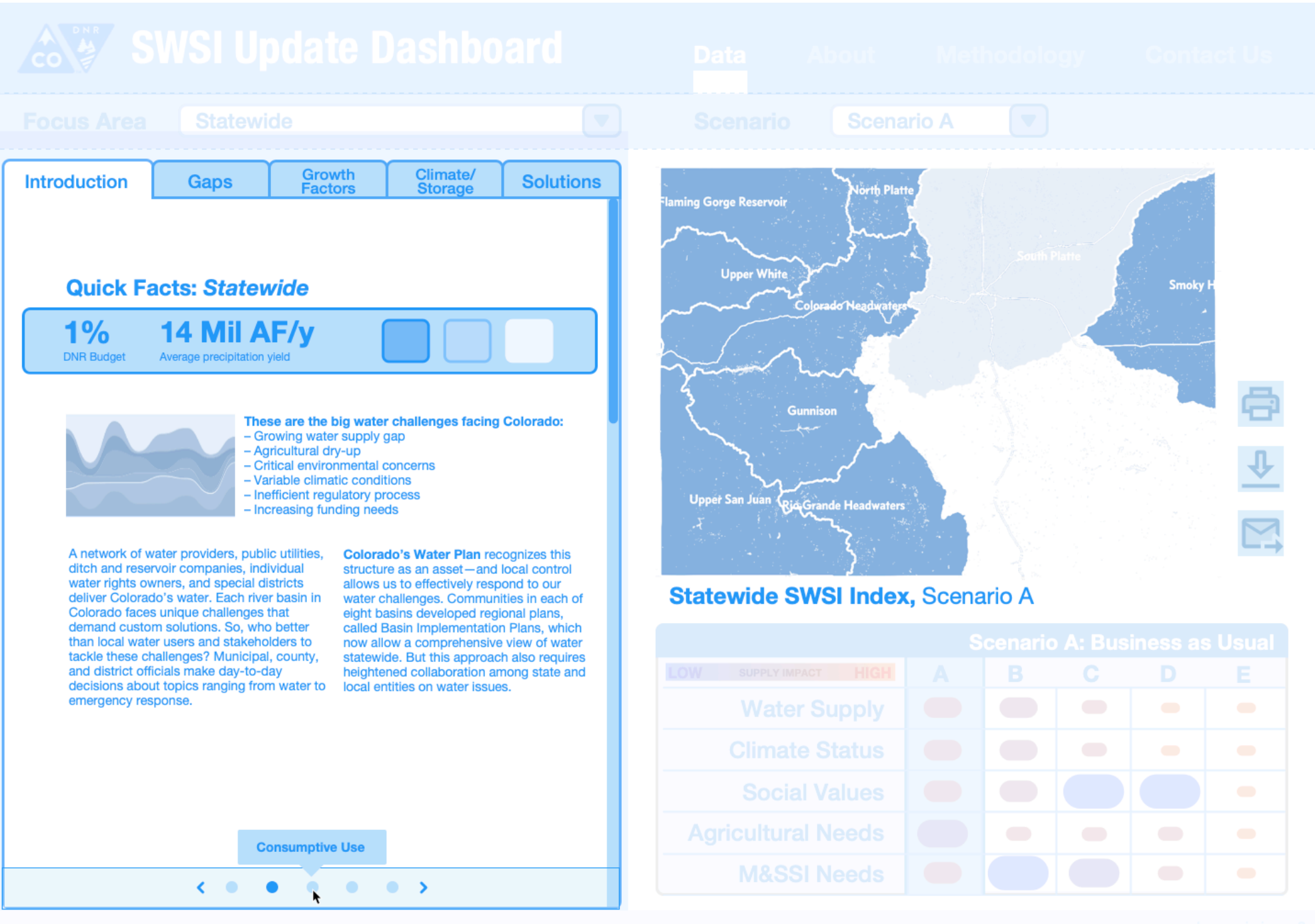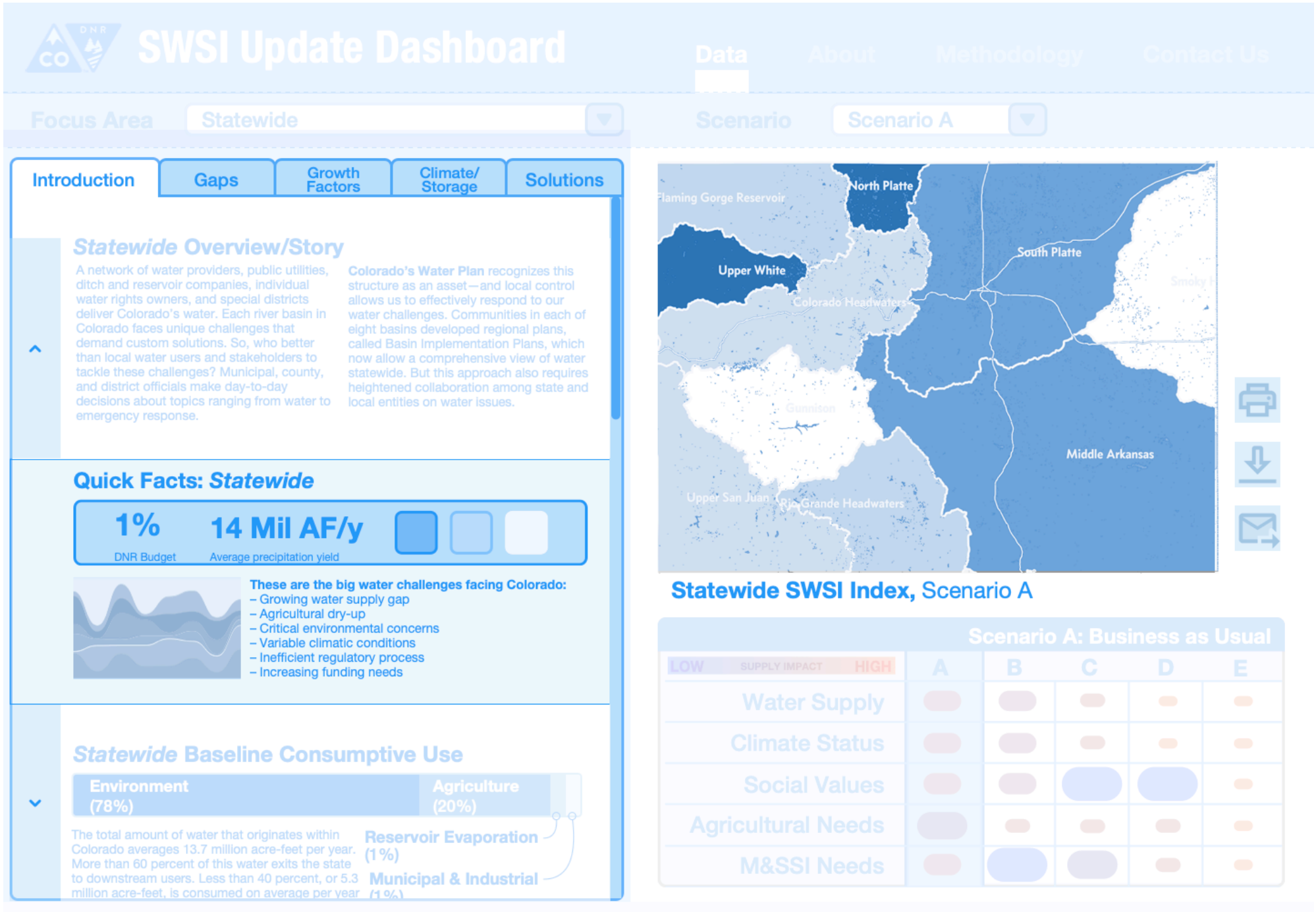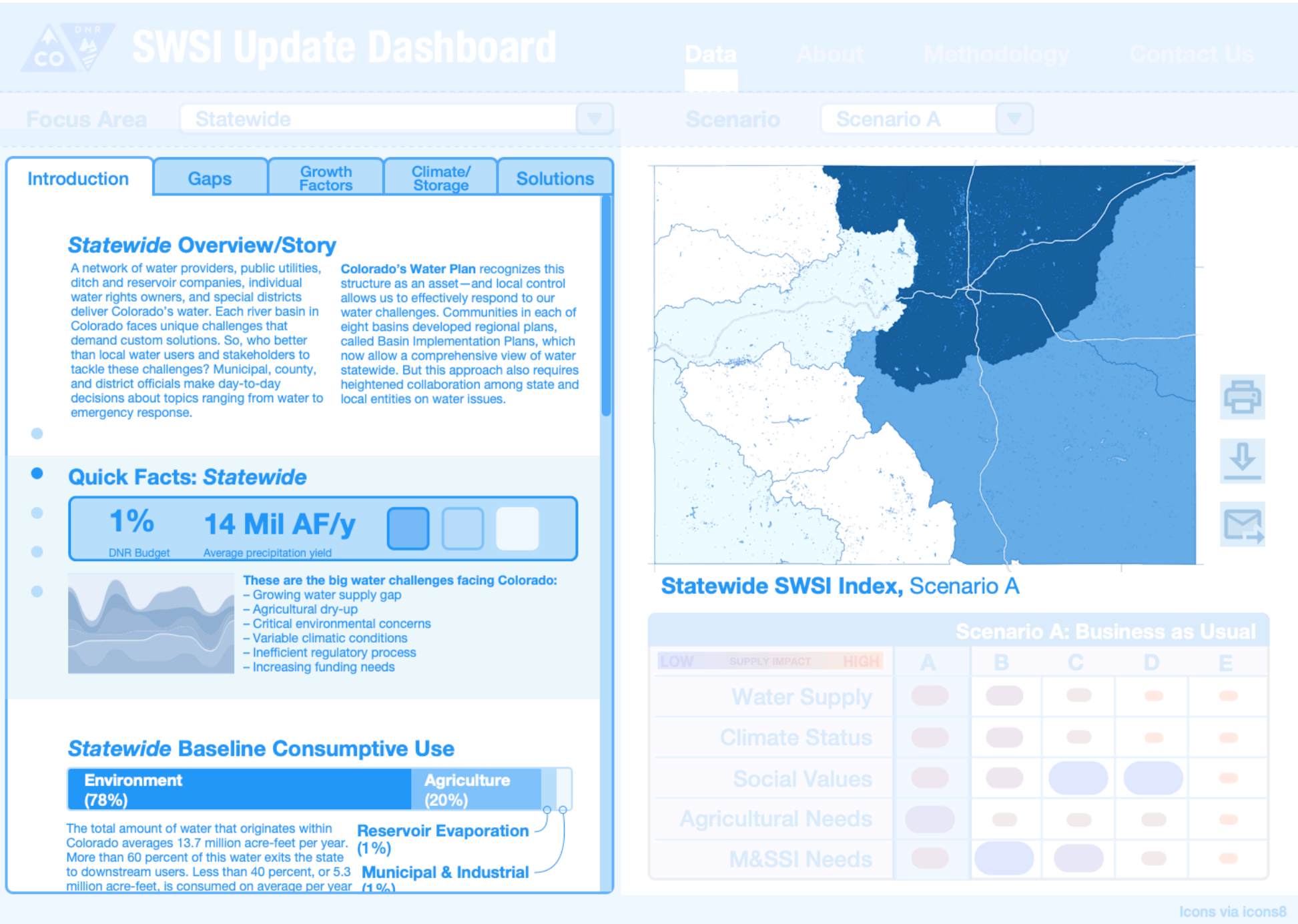
Option 1: Dot pagination with active element highlighting

Highlight active story elements using dot scroll/paginating. Active story element will correlate with active map display, if any.

Option 2: Carousel with active element highlighting

Highlight active story elements using a carousel format. Active story element will correlate with active map display, if any.

Option 3: Horizontal dot pagination with tooltips

Active story elements displayed on a single page, progress through story using horizontal dot pagination. For navigating between pages, tooltip will provide page information on hover. Active page story will correlate with active map display, if any.
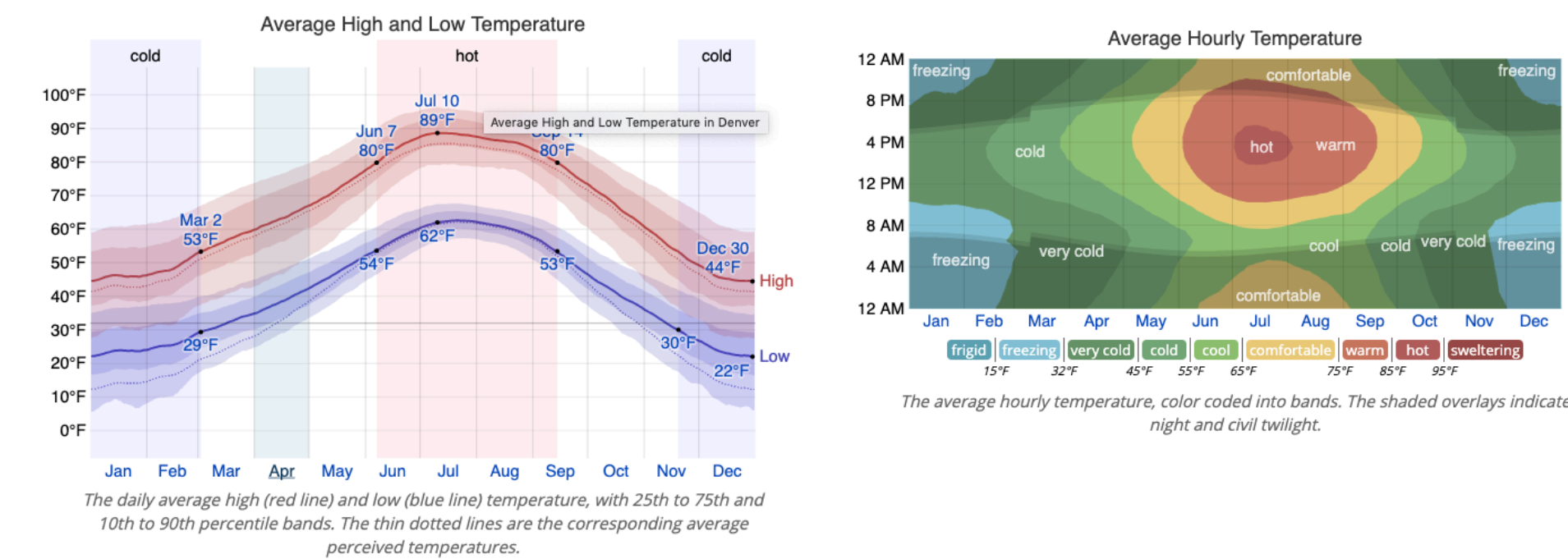
Challenge: Determining ideal visualization

Given the number of proposed stories across a wide variety of subject areas, determining appropriate visualization formats for each story will be paramount. Below are a number of examples of key story elements that we believe could serve the larger narrative, displayed in different ways.
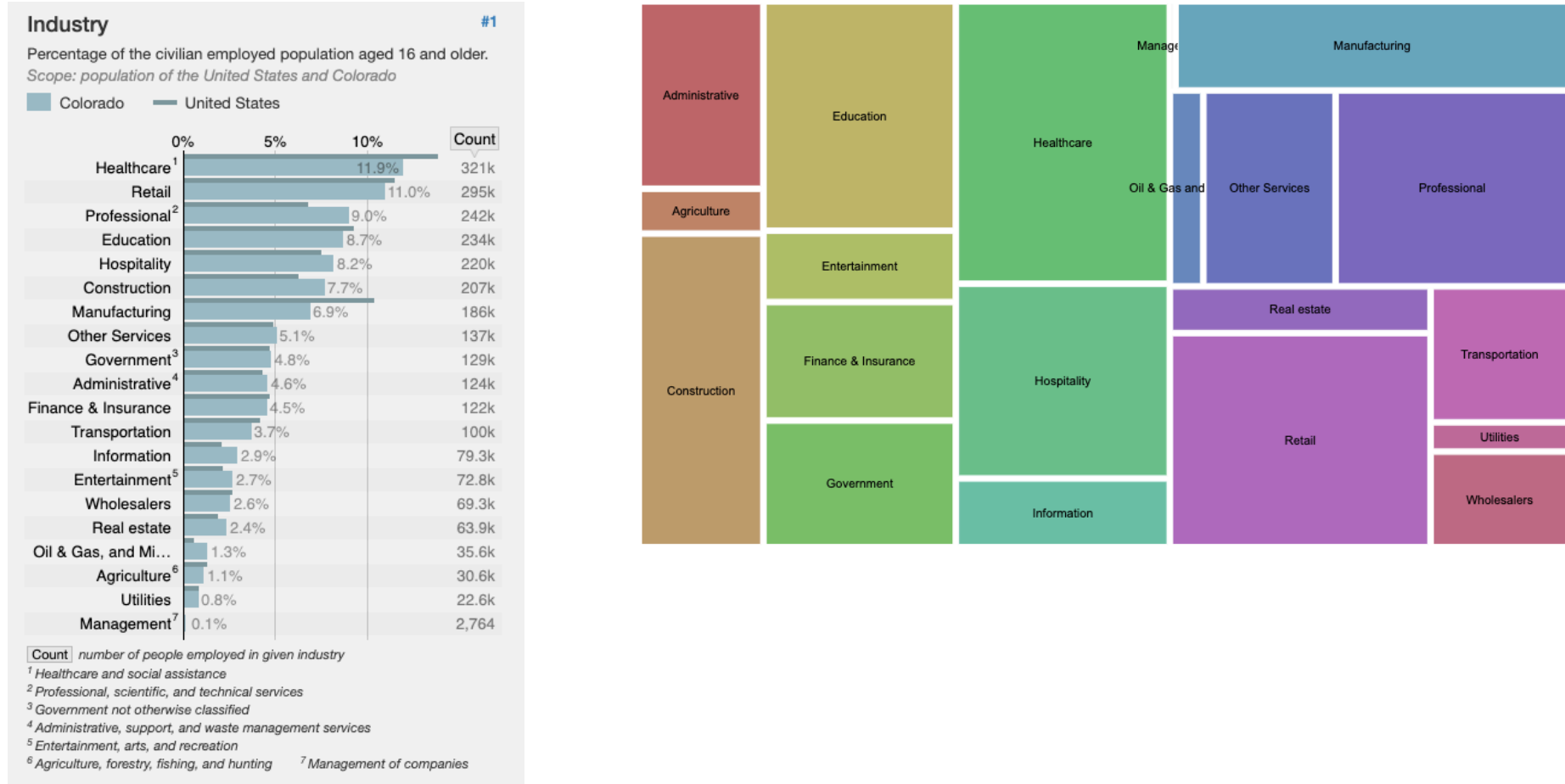
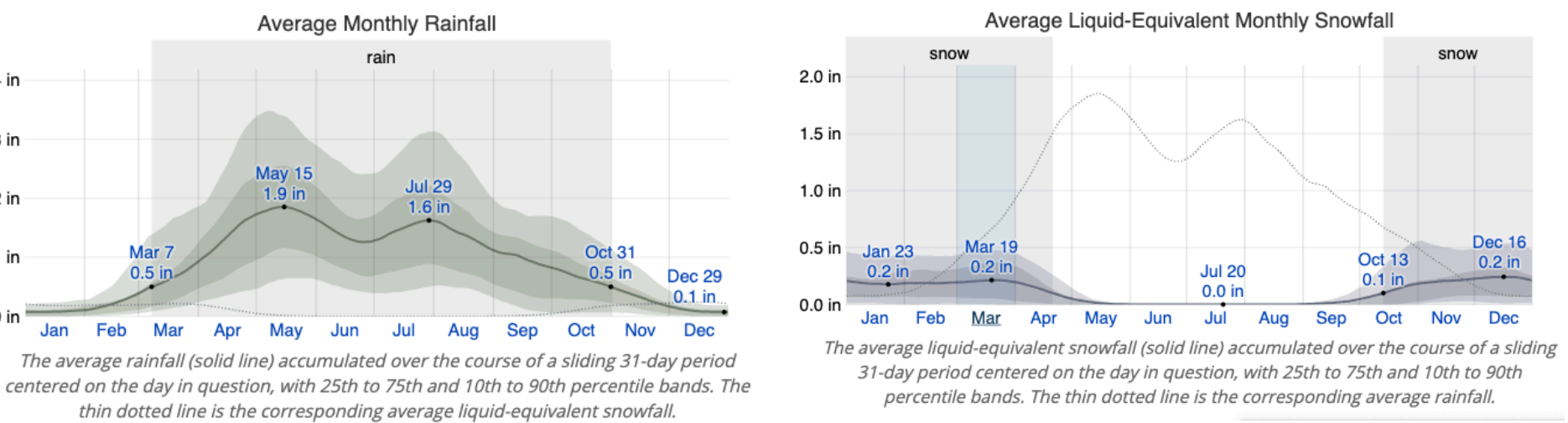For more information, *Flowing Data's* Nathan Yau wrote about this phenomenon on his website at: https://flowingdata.com/2017/01/24/one-dataset-visualized-25-ways/

Growing season

The percentage of time spent in various temperature bands. The black line is the percentage chance that a given day is within the growing season.

https://weatherspark.com/y/3709/Average-Weather-in-Denver-Colorado-United-States-Year-Round

Average temperature

The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

The average hourly temperature, color coded into bands. The shaded overlays indicate night and civil twilight.

https://weatherspark.com/y/3709/Average-Weather-in-Denver-Colorado-United-States-Year-Round

Major industries

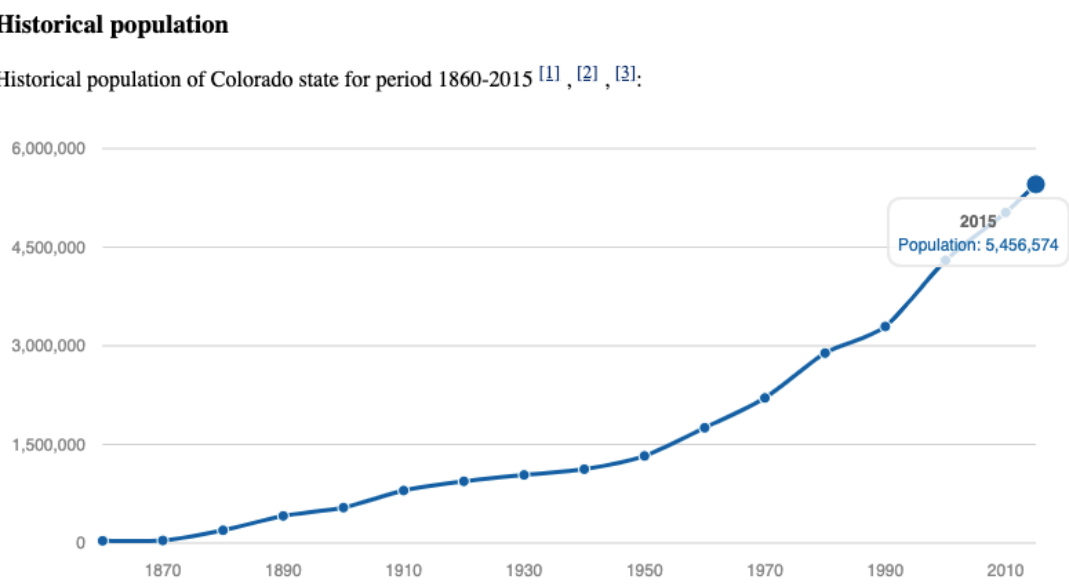https://statisticalatlas.com/state/Colorado/Industries

Landuse breakdown (percent Ag, M+I, other...)

Population

https://population.us/co/

Time series of average precip for each month

https://www.ncdc.noaa.gov/cag/statewide/time-series

Average annual precipitation

The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average liquid-equivalent snowfall.

The average liquid-equivalent snowfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average rainfall.

https://weatherspark.com/y/3709/Average-Weather-in-Denver-Colorado-United-States-Year-Round

Population: percent urban/rural

86.2% urban

https://www.icip.iastate.edu/tables/population/urban-pct-states