Kansas Reservoirs

Kansas Water Hub

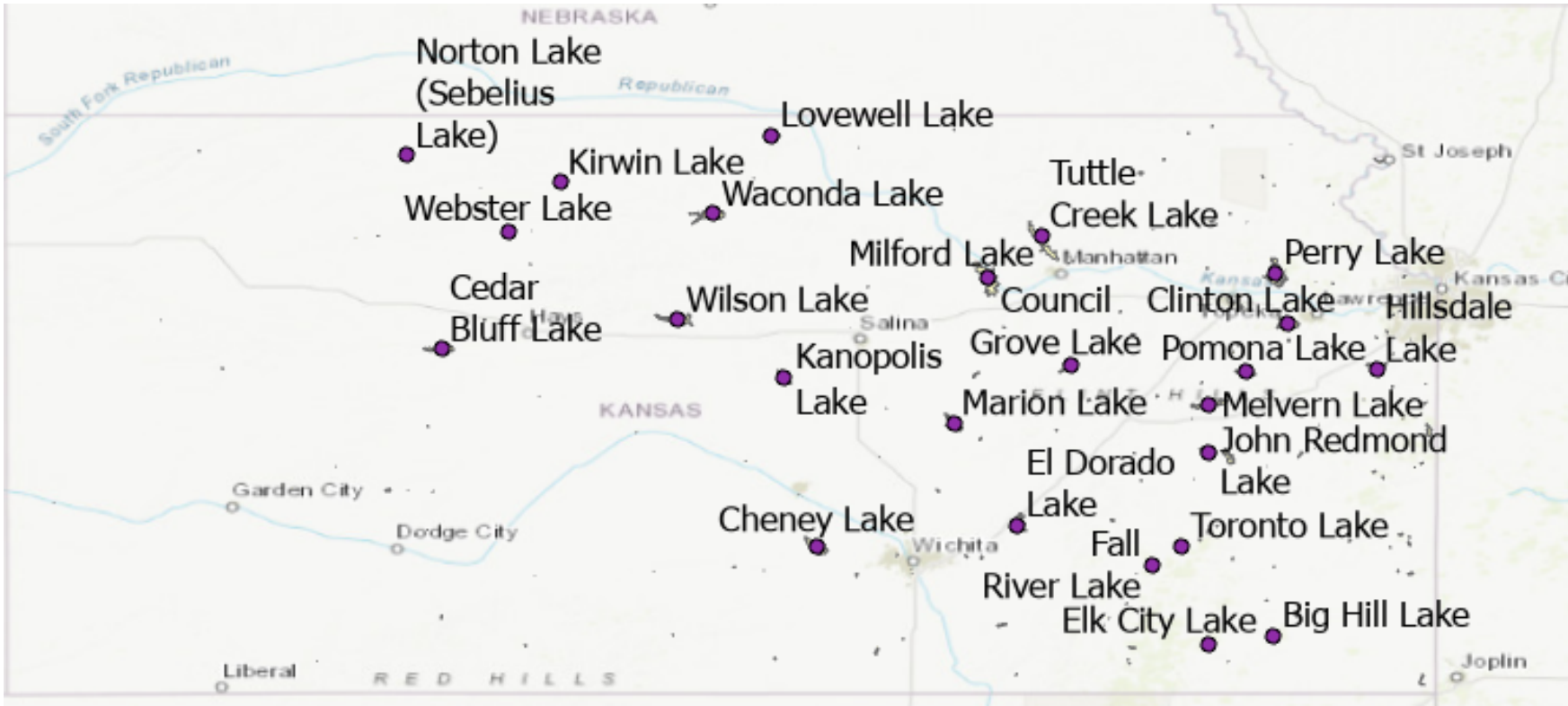
University of Kansas

June 24th, 2024

Motivation for Project

Secure, Protect, and Restore Kansas Reservoirs

Reservoir Locations



Data, Research, and Study Needs

Develop a stream-aquifer model of the Kansas River alluvial aquifer from Junction City to the junction with the Missouri River.	Study benefits of watershed conservation practice implementation on sedimentation and nutrient loading rates.	Increase the frequency of reservoir bathymetry to monitor progress on sedimentation trends, reservoir storage loss and future water supply planning projections.
Develop future climatic scenario reservoir water supply planning capabilities.	Research restoration of riverscapes to reduce downstream reservoir sedimentation and improve water quality.	Engage in active sediment management studies with federal partners as cost-share and funding opportunities arise.
Support HAB data collection and remediation projects		

Table: Kansas Water Plan Highlighted Needs

Questions of Interest

Storage capacity is continually lost to sedimentation in reservoirs.

- How to best visualize this?
- Possibly look at elevation over time.
- Possibly look at storage capacity over time.

Use of reservoirs to mitigate damage from extreme events

- How to best visualize this?
- Possibly look at intake and overlay with severe storms that were declared disaster?

The quality of water in Kansas reservoirs is jeopardized by Harmful Algal Bloom events.

Overview of Data

Processing data

1. Hydrological Data
   - Kansas City District Hydrological Link
   - Tulsa District Hydrological Link

---

2. Reservoir Water Quality Data
   - Kansas City District Water Quality Program
   - Tulsa District Water Quality Program

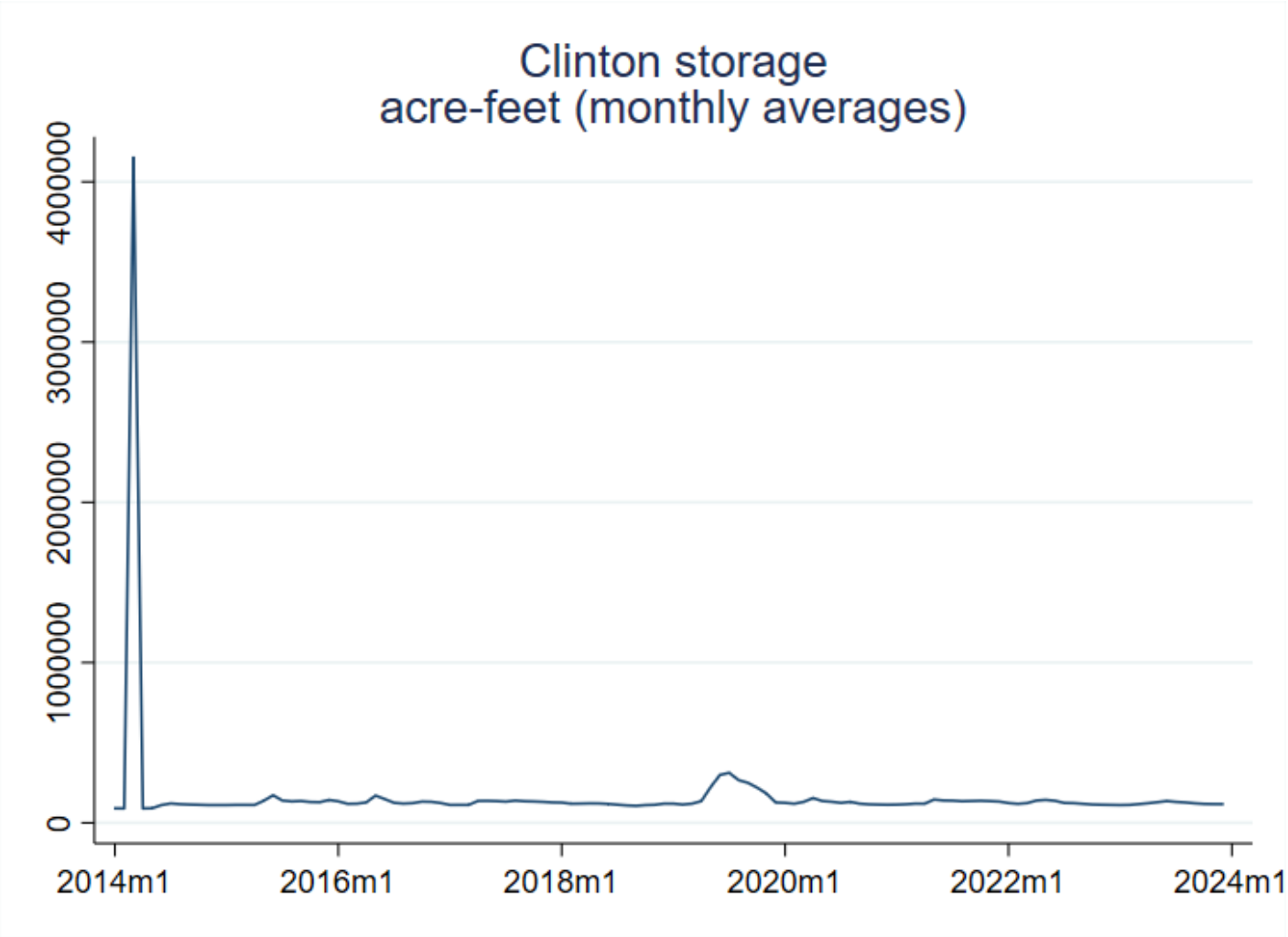
The *hydrological data* has been procressed by scraping the data and joining disparate reports.
The *water quality data* is still to be processed.

More work to do to make water quality data useable

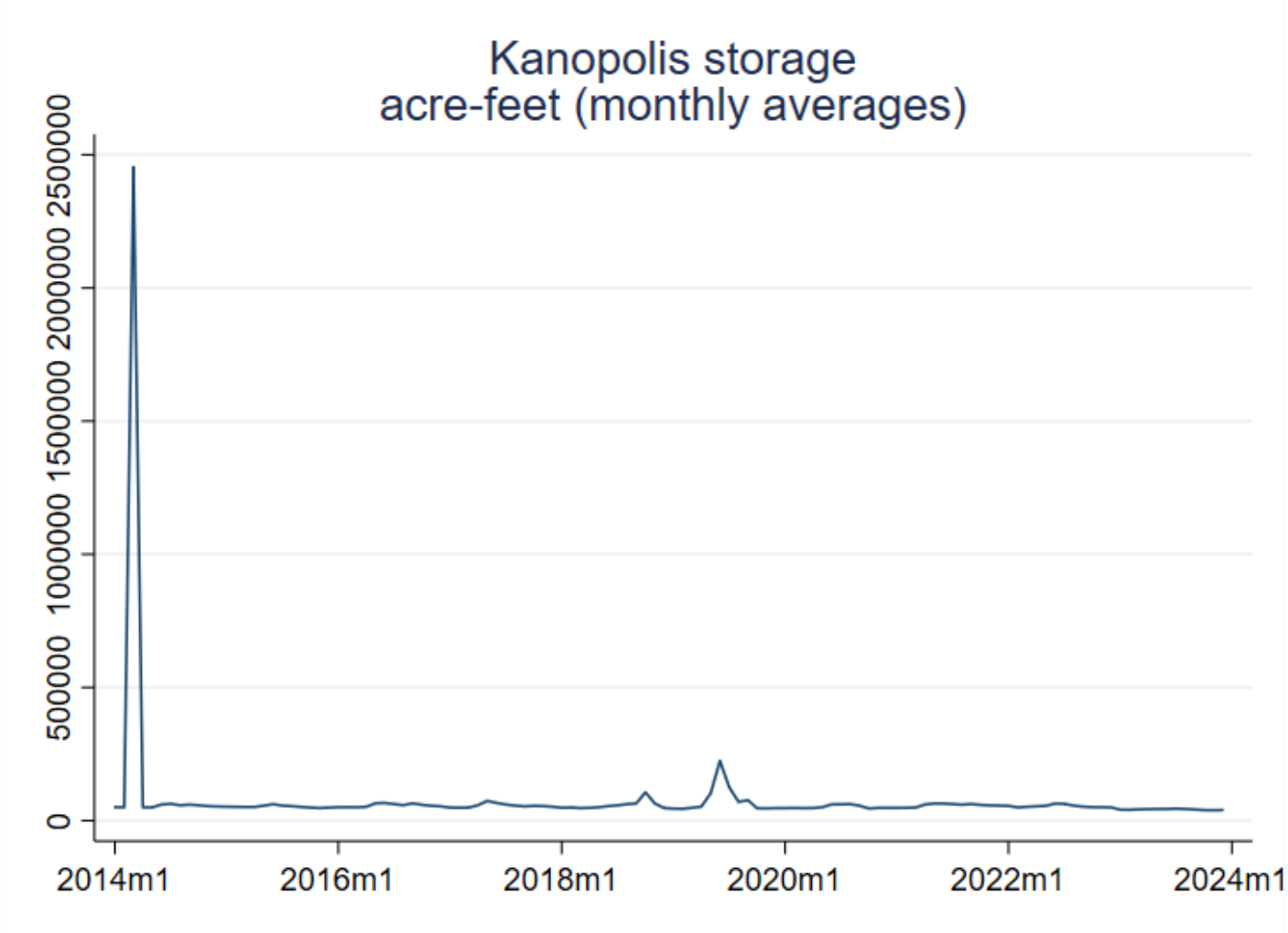
Station	Depth	Date	Time	Atrazine	Alachlor	Metolachlor	Cyanazine	Metribuzin	Simazine	Acetochlor	Glyphosate
	(m)	mm/dd/year	hhmm	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
WI-16	0.1	4/18/2000	1036	0.0400	0.0400	0.1600	<0.04				
WI-16	0.1	5/25/2000	0730	0.1400	0.0400	<0.05	<0.04				
WI-16	0.1	6/14/2000	0800	0.2100	0.0400	0.1900	<0.04				
WI-16	0.1	7/13/2000	0830	0.2600	0.0400	0.0500	0.0400				
WI-16	0.1	8/15/2000	1415	0.2200	0.0400	<0.05	<0.04				
WI-16	0.1	9/13/2000	1000	0.2100	0.0400	<0.05	<0.04				
WI-16	0.1	4/25/2001	1141	0.1900	0.0400	<0.05	<0.04				1.300
WI-16	0.1	5/24/2001	0925	0.2700	0.0400	0.0600	<0.04			<0.04	5.050
WI-16	0.1	6/14/2001	1025	0.2600	0.0400	<0.05	<0.04			<0.04	3.250
WI-16	0.1	7/18/2001	0935	0.4200	0.0400	0.0900	0.0500				
WI-16	0.1	8/16/2001	0845	0.6000	0.0500	0.0800	<0.04				
WI-16	0.1	9/25/2001	1000	0.5200	0.0600	0.0900	<0.04				
WI-16	0.1	4/22/2002	0948	0.6200	0.1000	0.0500	0.0600				
WI-16	0.1	5/16/2002	0924	0.6300	0.0600	0.0900	0.0500				
WI-16	0.1	6/11/2002	0825	0.6500	0.0400	0.1200	0.0400				
WI-16	0.1	7/18/2002	1025	0.6000	0.0400	<0.05	0.0800				
WI-16	0.1	8/15/2002	0925	0.5700	0.0700	<0.05	<0.04				
WI-16	0.1	9/19/2002	0913	0.5000	0.0400	0.0600	<0.04				

Descriptive Analysis

Clinton storage over time



Kanopolis storage over time



Thinking through visualizations of storage over time

Clinton and Kanopolis both see spikes in early 2014 that other reservoirs do not see.

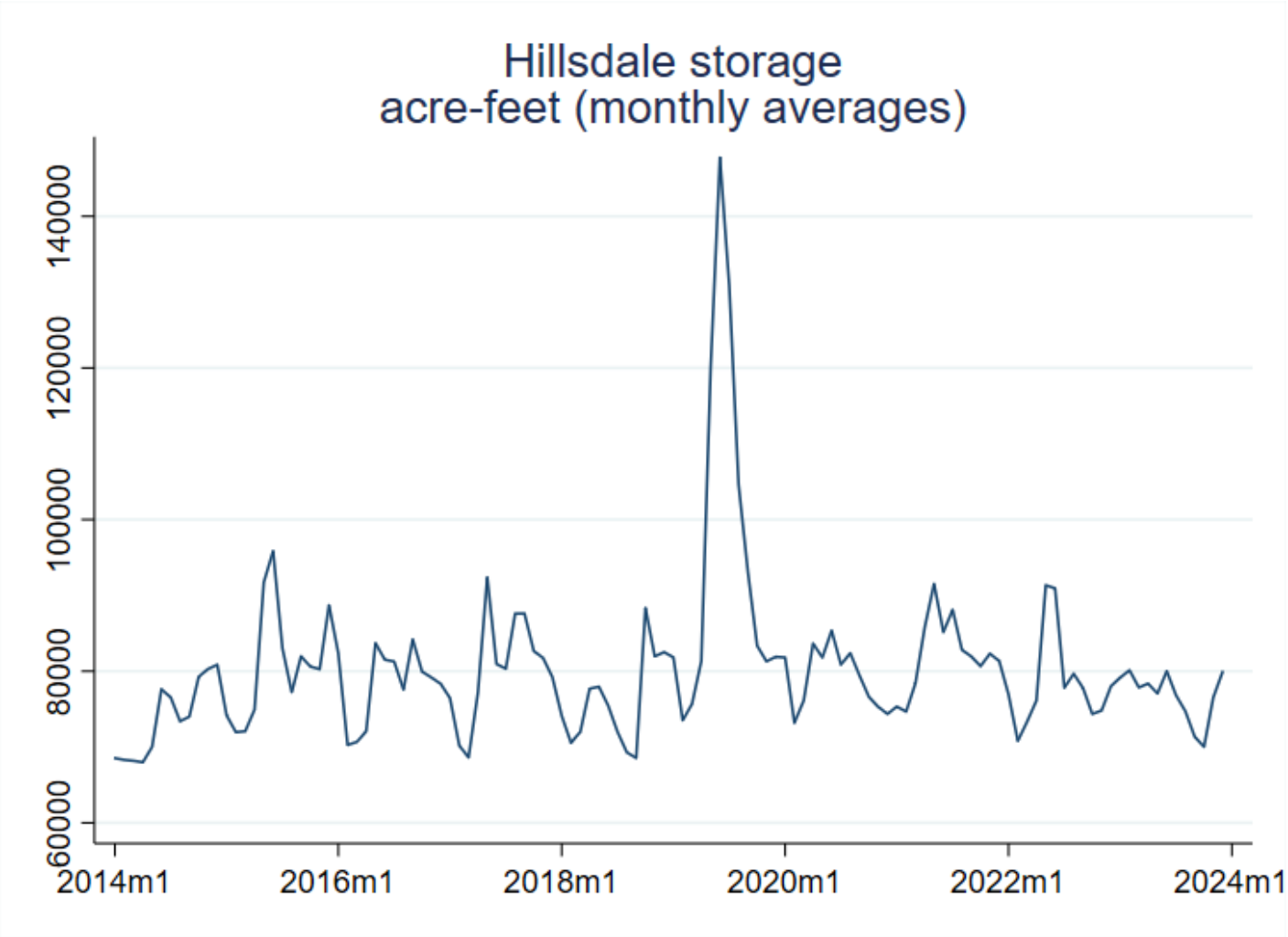
1. How is it best to classify reservoirs?
2. Is there significant variation by multipurpose use?

Milford, Perry, Pomona, Tuttle Creek, and Wilson see more variation in their monthly storage averages.

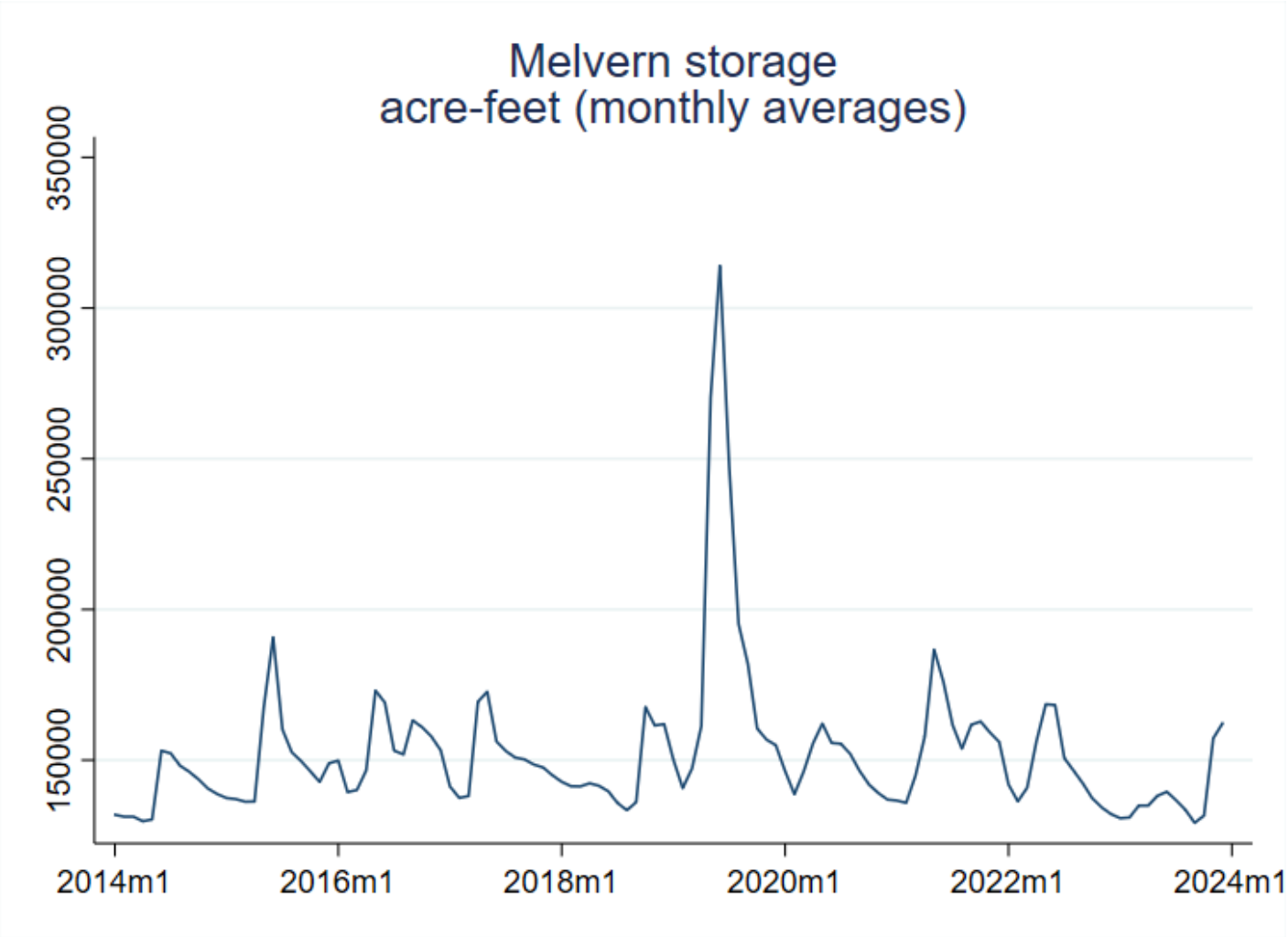
1. These reservoirs see a spike in 2019 that is less pronounced in Clinton and Kanopolis.

Does it make sense to organize reservoirs by USACE district and by Bureau of Reclamation?

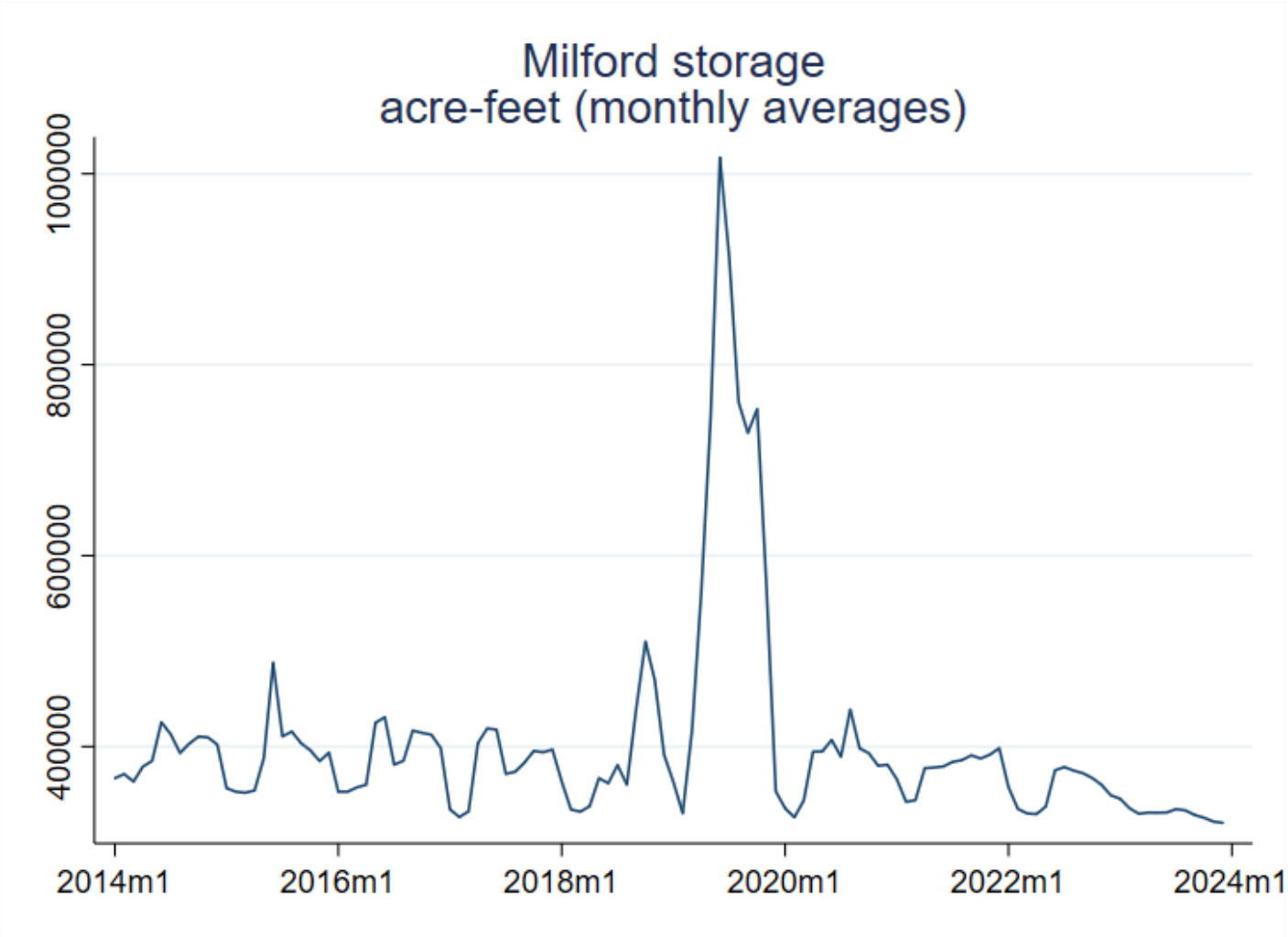
Hillsdale storage over time



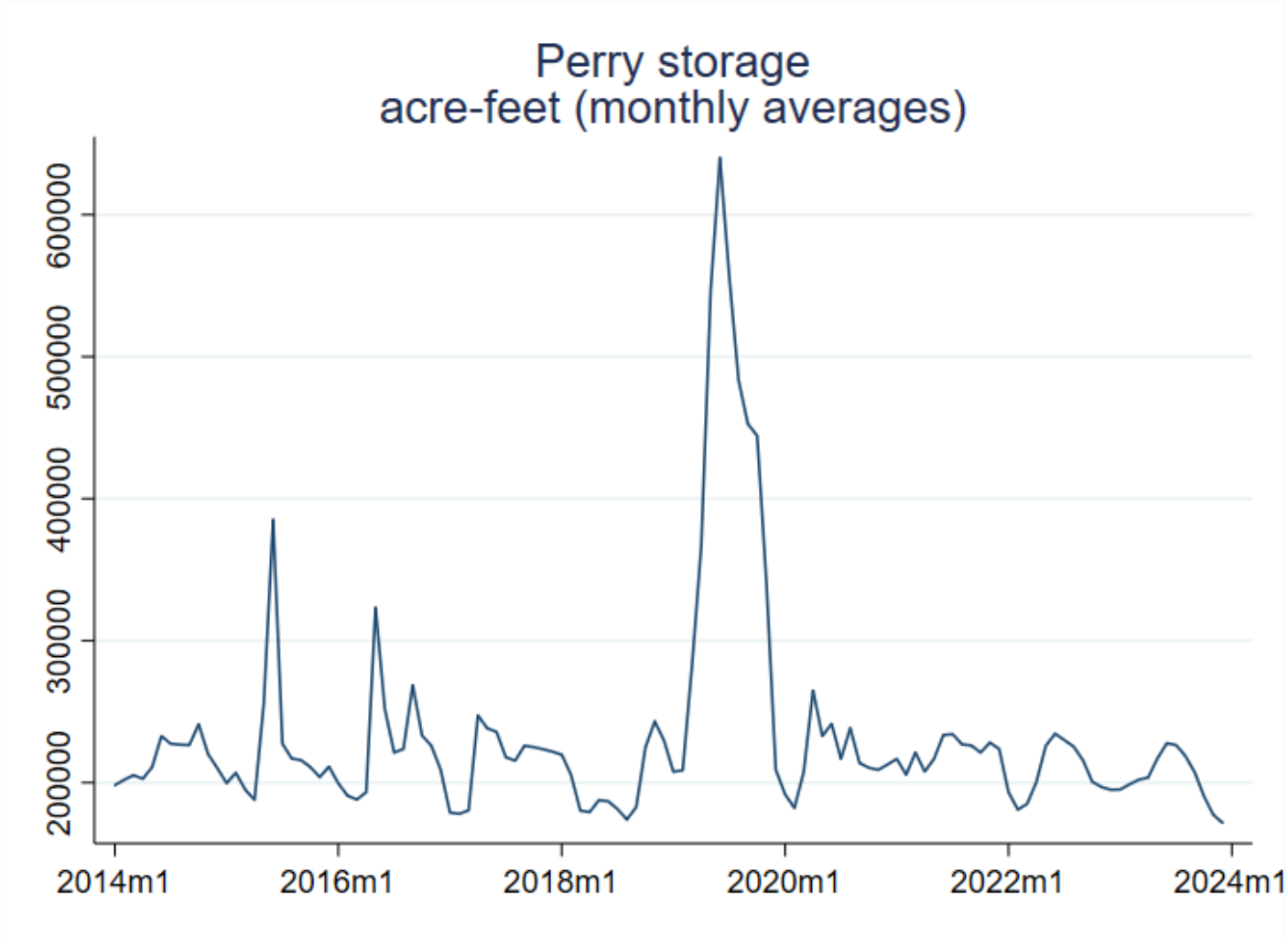
Melvern storage over time



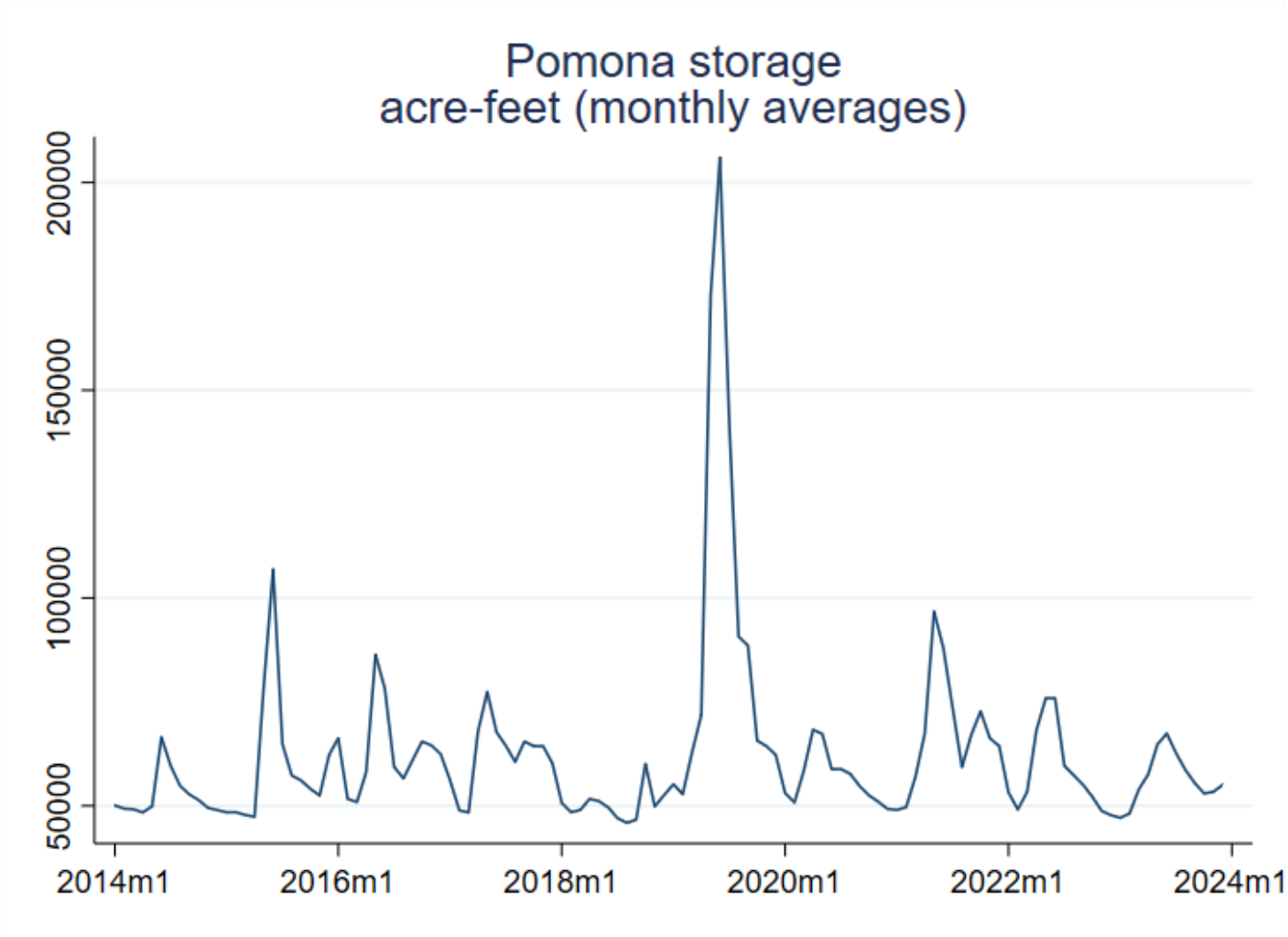
Milford storage over time



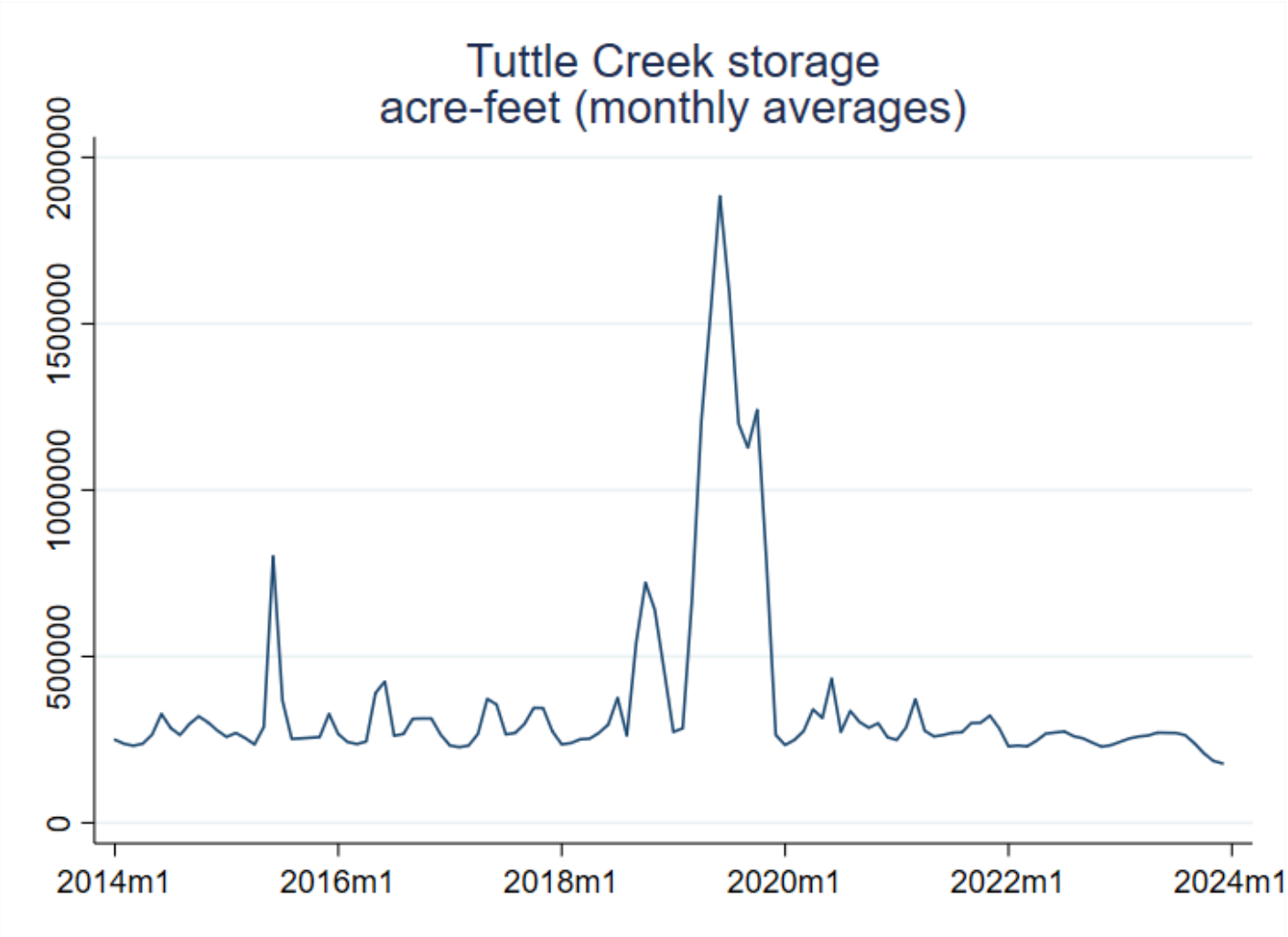
Perry storage over time



Pomona storage over time



Tuttle Creek storage over time



Wilson storage over time

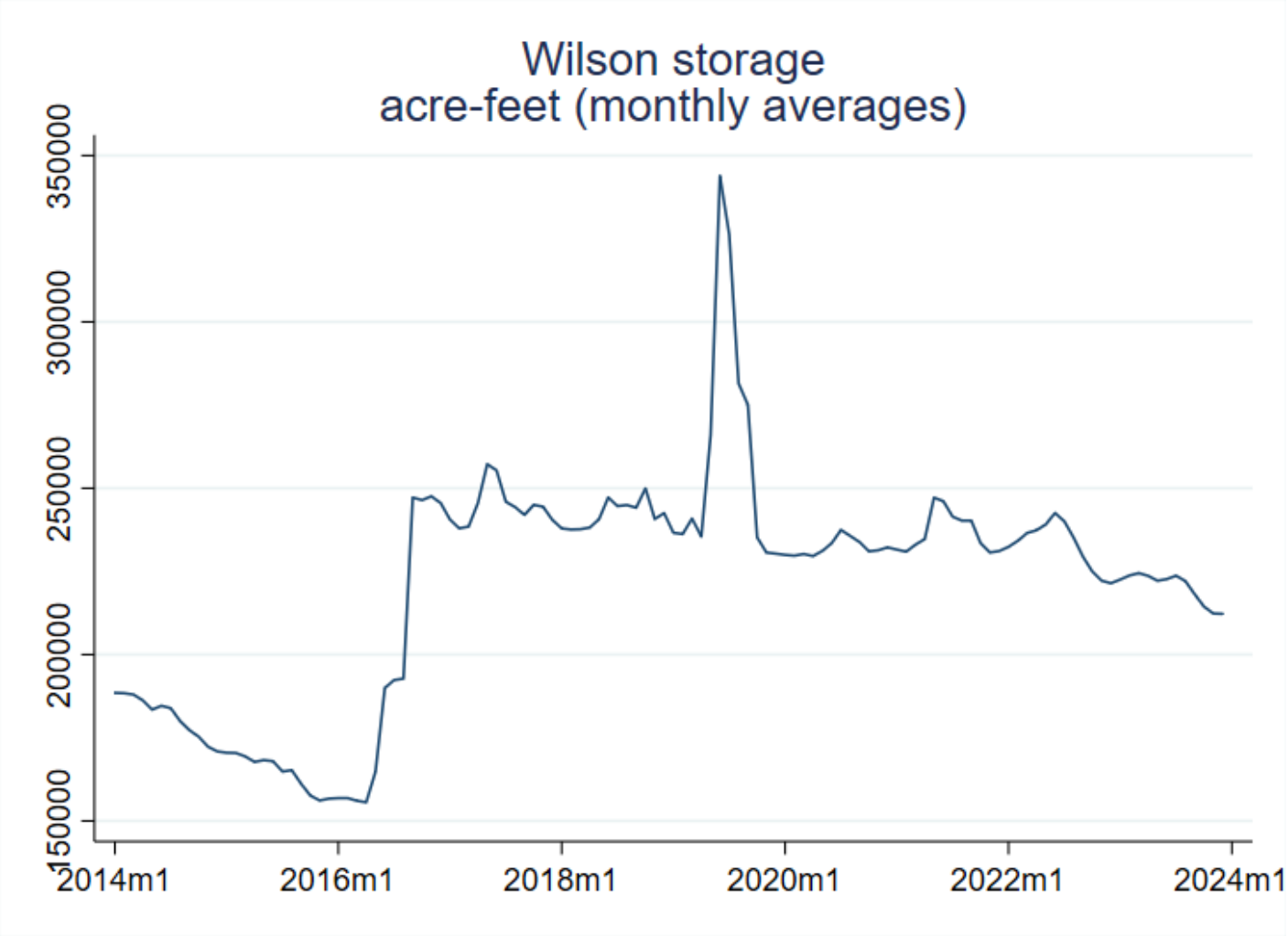


Figure: Structural shift in storage in 2016.

Looking at the relationship between reservoir inflow and severe storm declared disaster date.

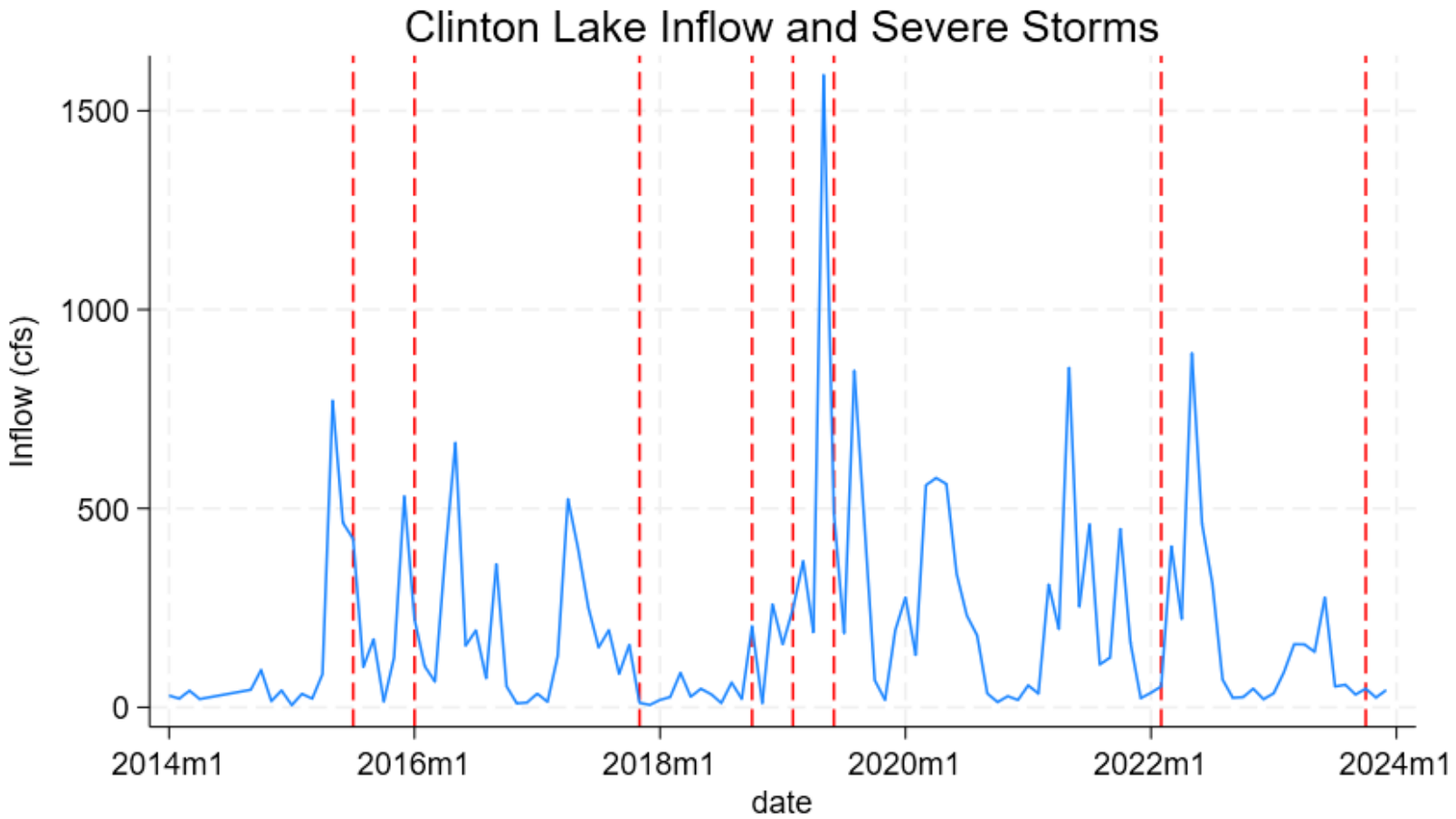


Figure: Vertical red lines represent severe storm declared disasters

Looking at the relationship between reservoir inflow and severe storm declared disaster date.

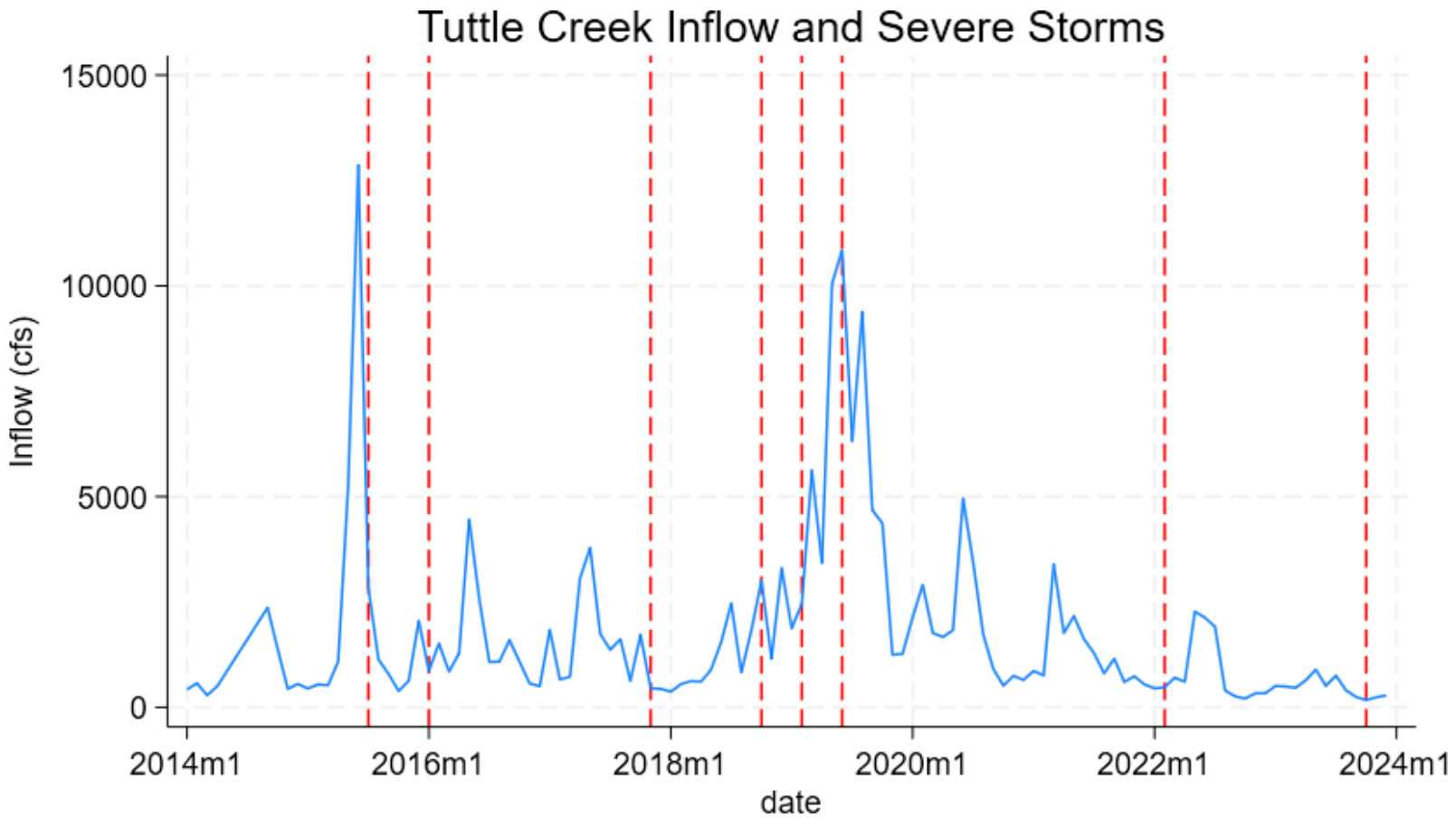
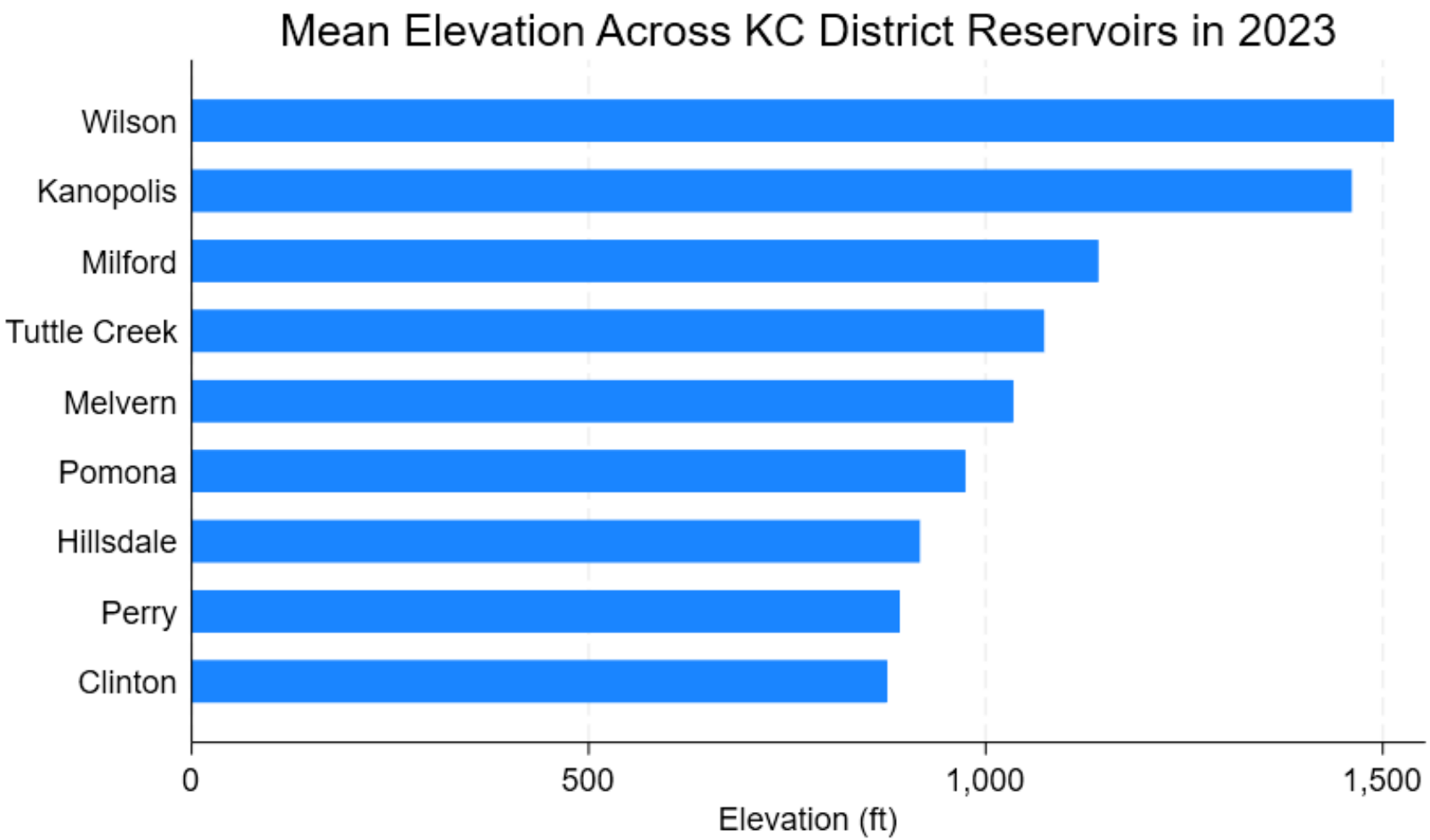
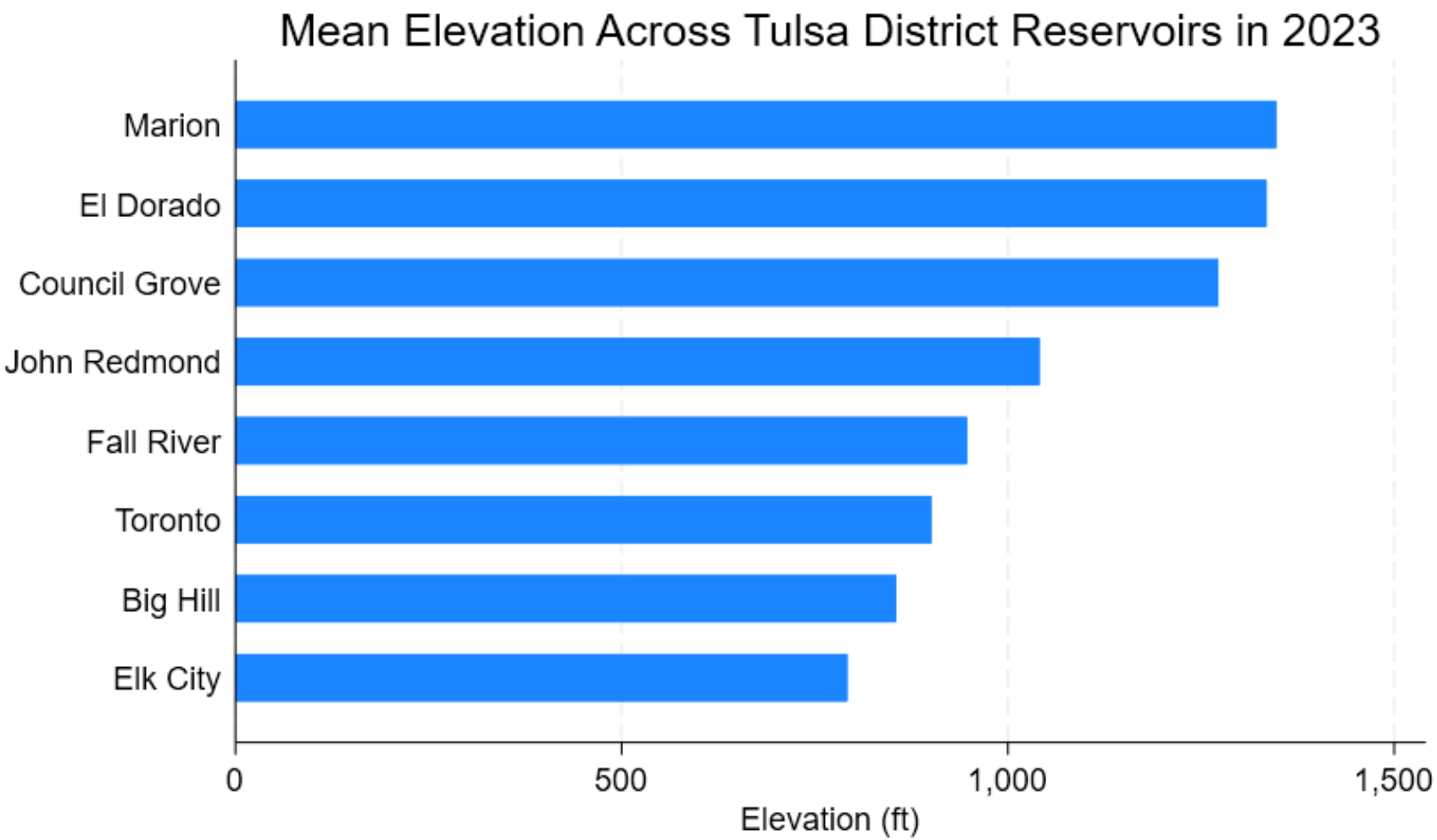


Figure: Vertical red lines represent severe storm declared disasters

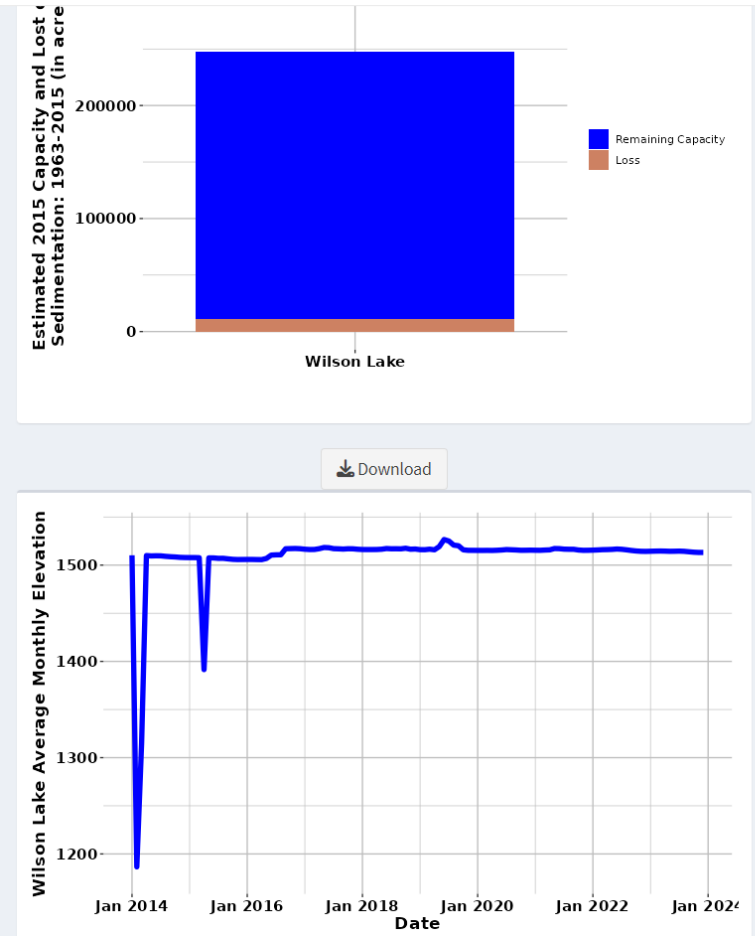
Average reservoir elevation in the USACE KC District (2023)



Average reservoir elevation in the USACE Tulsa District (2023)



A sneak peak of the dashboard



The 24 Kansas federal reservoirs were built from 1948 to 1981 to serve as water sources, recreational opportunities, and key flood control tools for those downstream. In some Kansas reservoirs, however, sediment from inflowing water has accumulated, reducing storage capacity. The map above shows the location of each. Select a reservoir to see the extent of its capacity loss between the reservoirs construction and a 2015 bathymetric survey, as well as average elevation by month from 2014-present. Sources: Kansas Biological Survey, 2022, and US Army Corps of Engineers, 2024.

Reservoirs interactive visualizations link

Future work to complete this section of the dashboard

There is still work to determine how best to use the reservoir data that the USACE make available.

1. Identify the visualiations and summary statistics that can best provide insight about useful metrics for the KWP.
2. Create dashboard infrastructure in ArcGIS and R Shiny to make these visualizations and summary statistics dynamic for all reservoirs.

Work to incorporate reservoir water quality data into the analysis.

1. How should this water quality data interact with other water quality information in the next section?

Questions and Feedback

Thank you for your survey responses