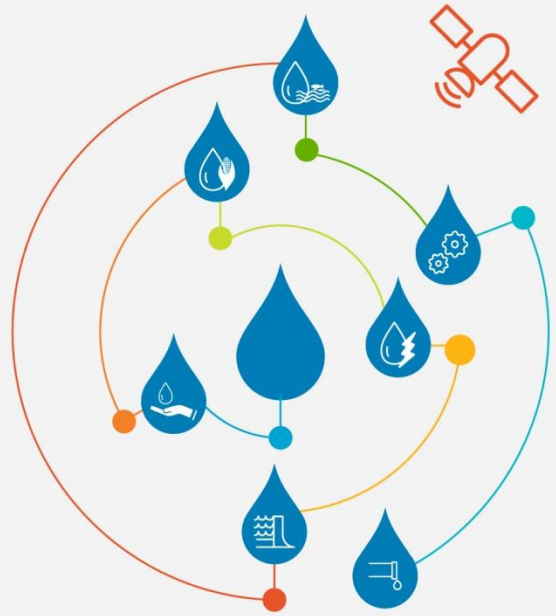
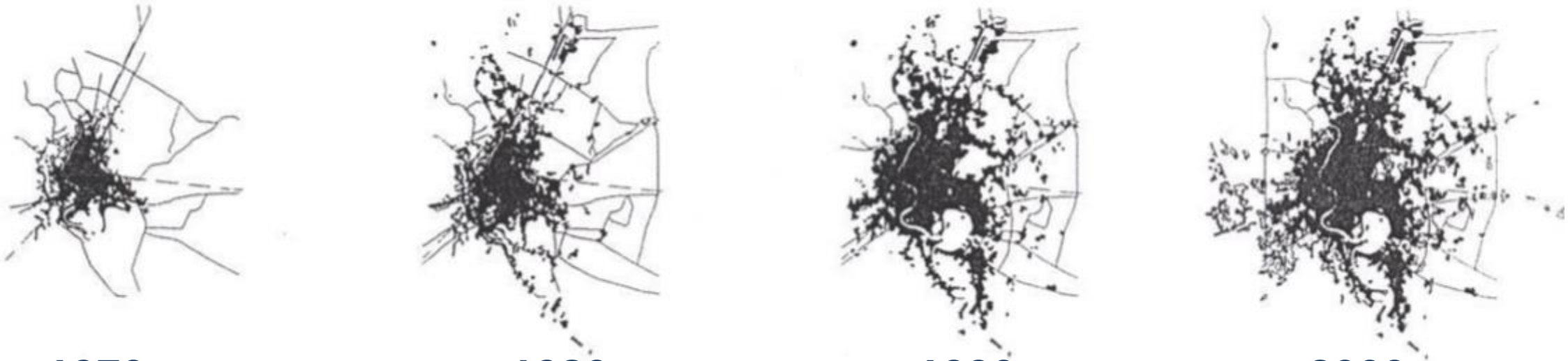
Decision Support for Watershed-scale Real-time Water-Quality Monitoring to Determine Impacts of Urbanization on Water Treatment



Sachin D. Shah
U.S. Geological Survey
Geospatial Science + Cyber Innovation Branch
4 October 2018

ADB

The Mega-City: Importance of Scale in Scientific Monitoring



1970 1980 1990 2000

- **Focused and systematic** water supply and treatment planning
- **Community-focused strategy** for essential services
- Drive a management plan for water quality
- Better capacity to **anticipate and respond**

Water Treatment for Water Security

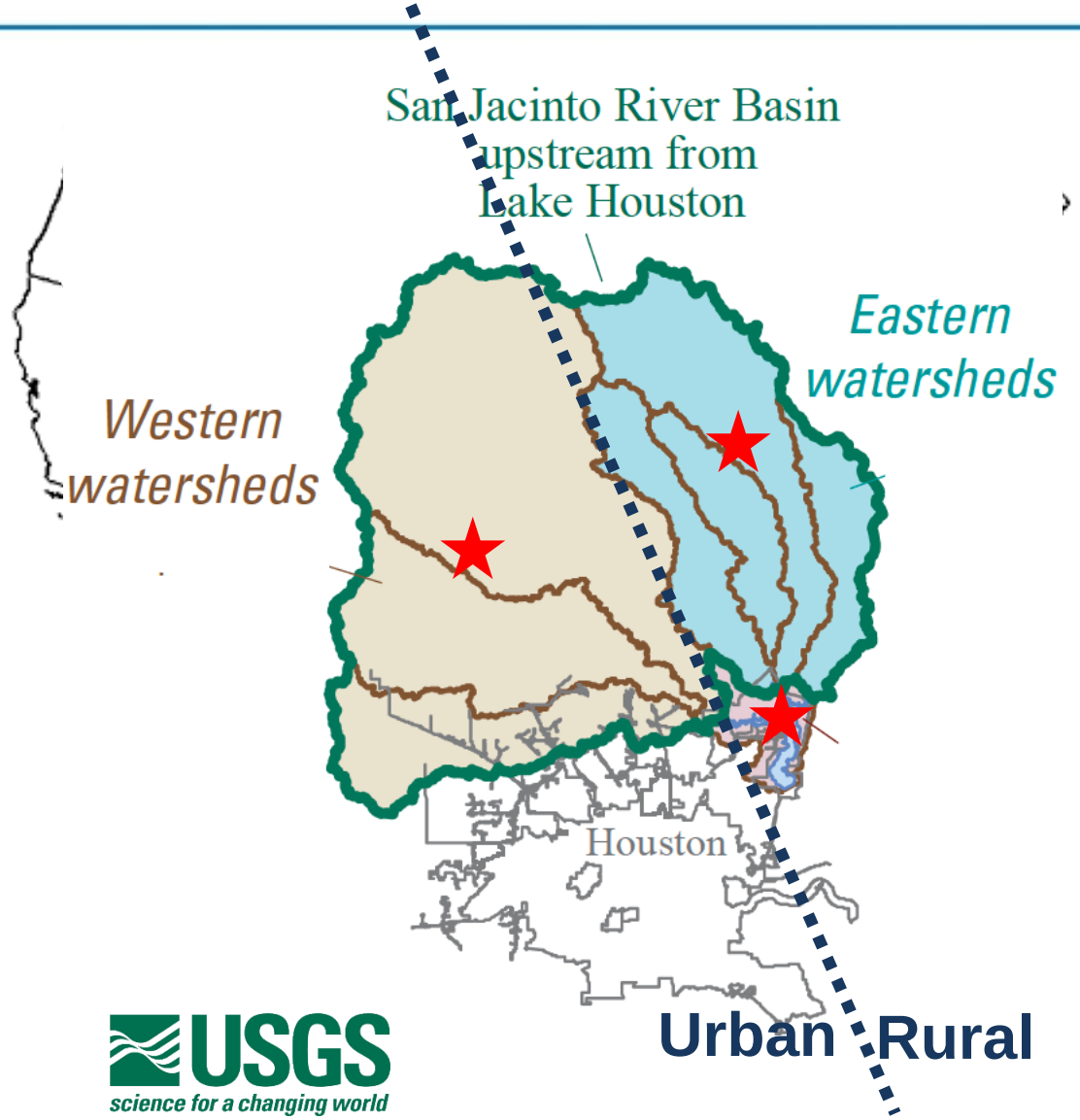
- Water treatment (water quality) → Water Security
- Water supply and sanitation: challenge in megacities
- Juxtaposition of **Urbanization** and **Rural** water quality impacts on treatment

SCALE OF MONITORING

USGS science for a changing world

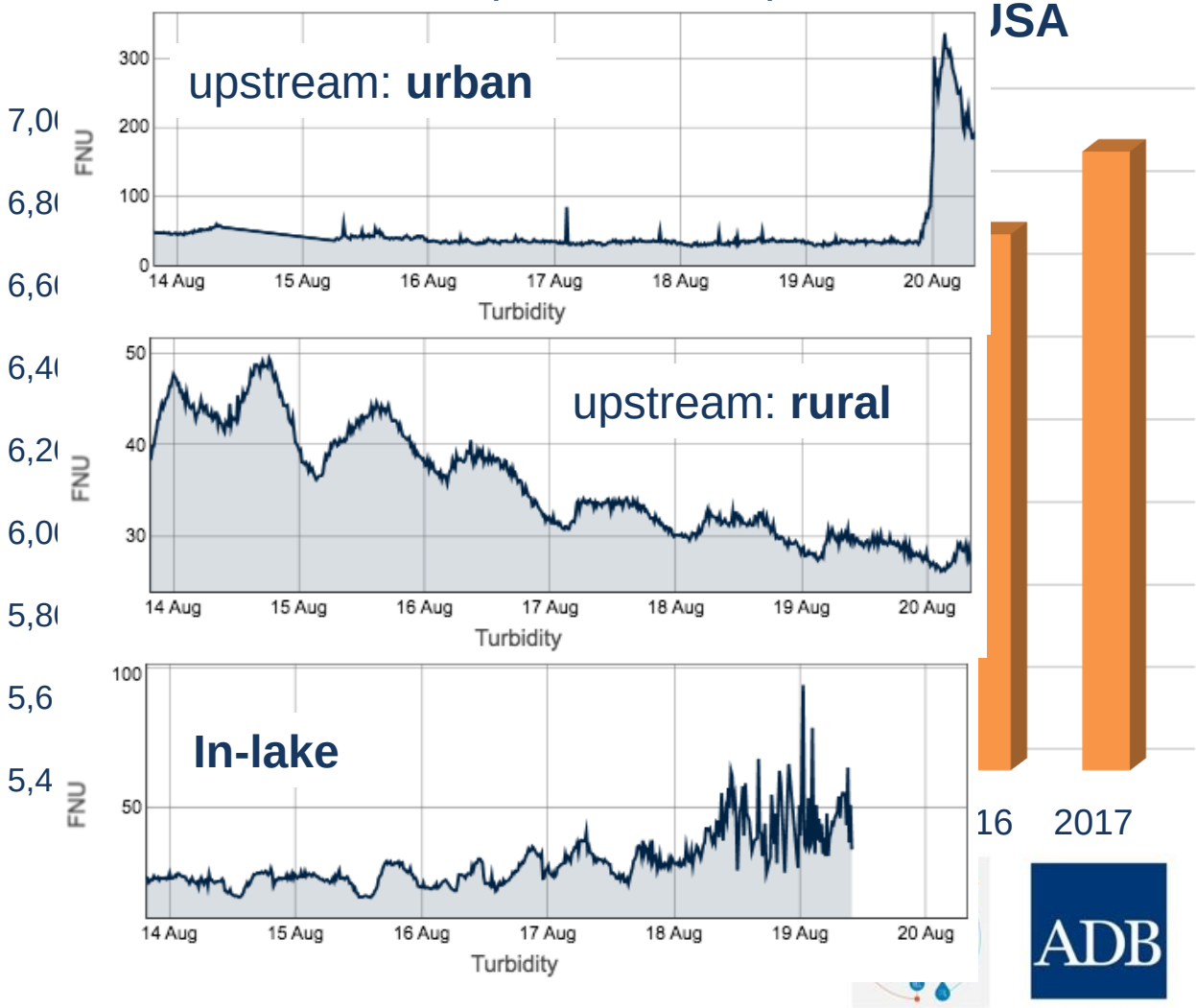
ADB

Water Treatment for Water Security



USGS
science for a changing world

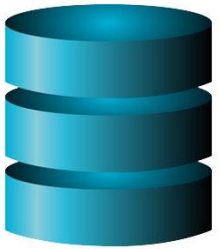
TURBIDITY: suspended solid particles



ADB

Technology for Proactive Preparations

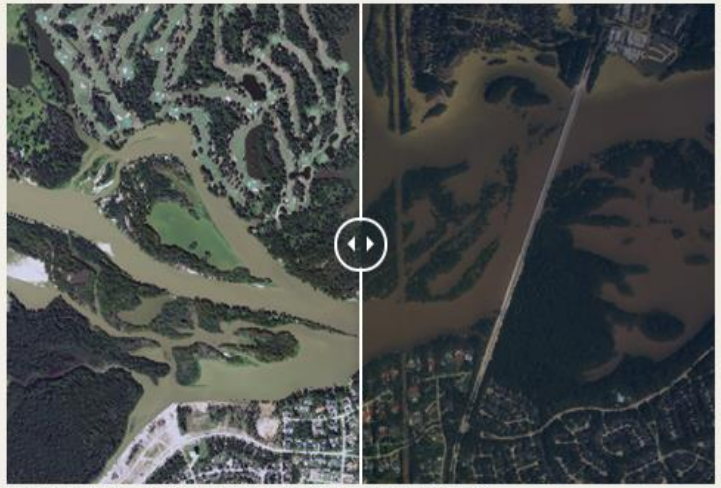
Turbidity	Streamflow
Dissolved Oxygen	Stage
Temperature	Forecasts
Salinity	Hazards
pH	Lake Elevation



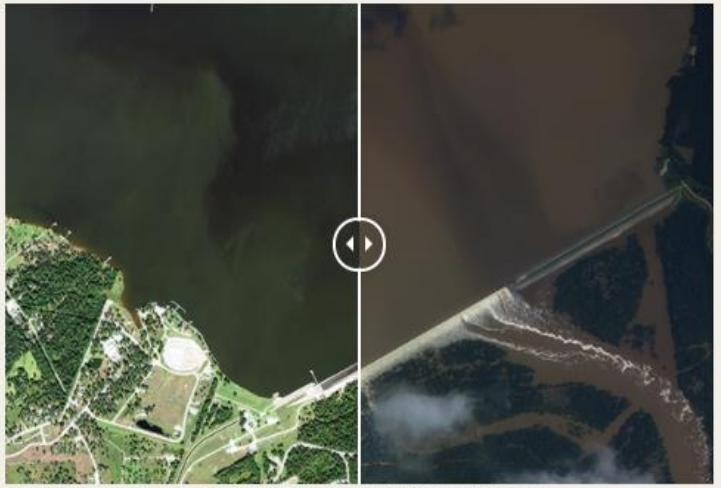
Urbanization Effects on Water Quality & Treatment

Typical and Elevated Turbidity

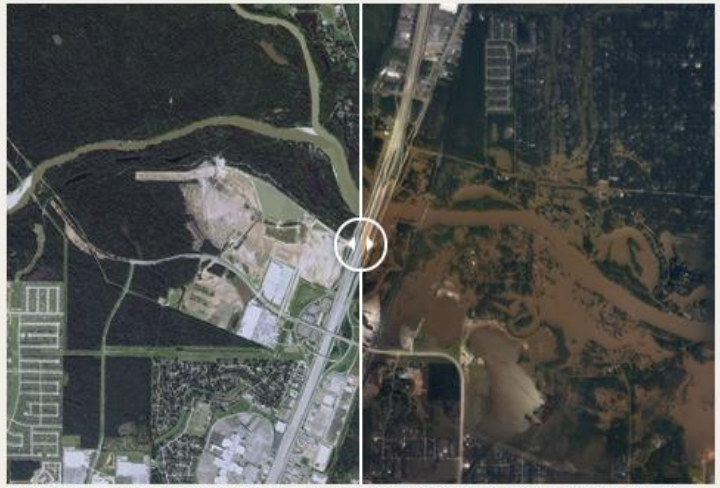
https://webapps.usgs.gov/lake_houston/viewer/



Left image: Typical turbidity at Kingwood, September 2016.



Left image: Typical turbidity at San Jacinto Dam, September 2016.



Left image: Typical turbidity on the West Fork San Jacinto River, September 2016.

Explore Water-Quality, Streamflow, and Reservoir Data

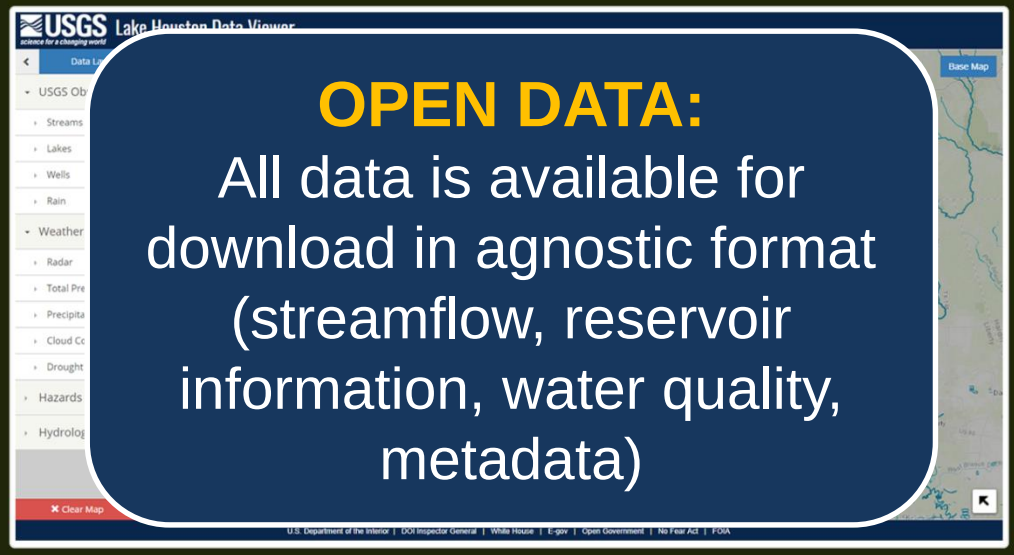
Real-time continuous data is collected at 31 gages in the Lake Houston watershed. Reservoir stage and capacity are collected at three reservoirs; discharge and gage height are monitoried along the mainstem of the San Jacinto River and tributaries feeding into Lake Houston; and water temperature, specific conductance, pH, dissolved oxygen, and trubidity are monitored at seven gages. Real-time continusous data is augmented and verified with discrete samples collected throughout the Lake Houston watershed.

Explore the Data

Looking for the raw data?

Water-quality, streamflow, and reservoir data are available as part of USGS data products.

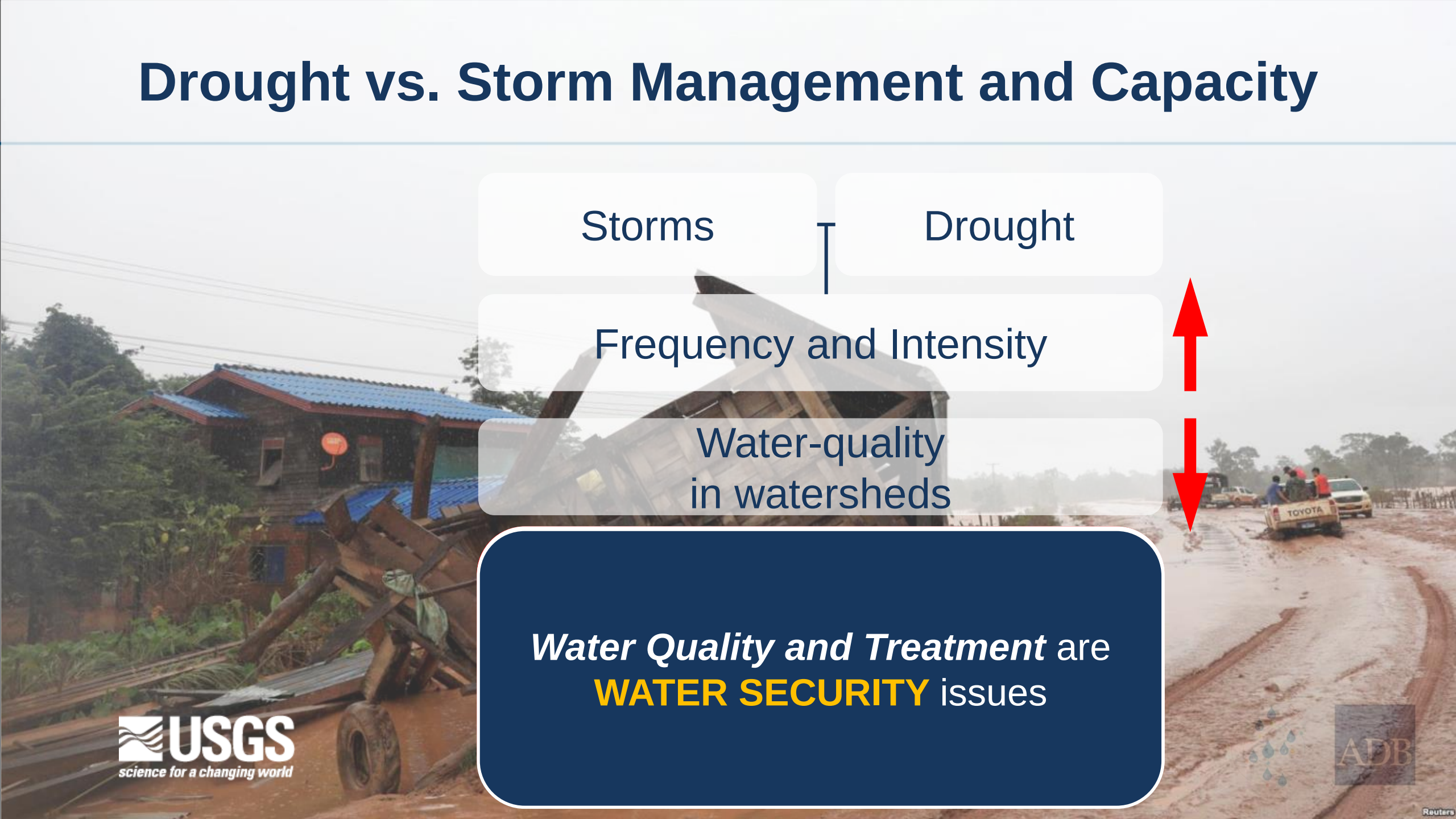
Get the Water-Quality Data | Get the Streamflow Data | Get the Reservoir Data | Get the Latest Report



OPEN DATA:

All data is available for download in agnostic format (streamflow, reservoir information, water quality, metadata)

Drought vs. Storm Management and Capacity



https://webapps.usgs.gov/lake_houston/viewer/

Flood Inundation Mapper (FIM)

Connecting urban flood risk to water quality:

River Stage (water height)

↓

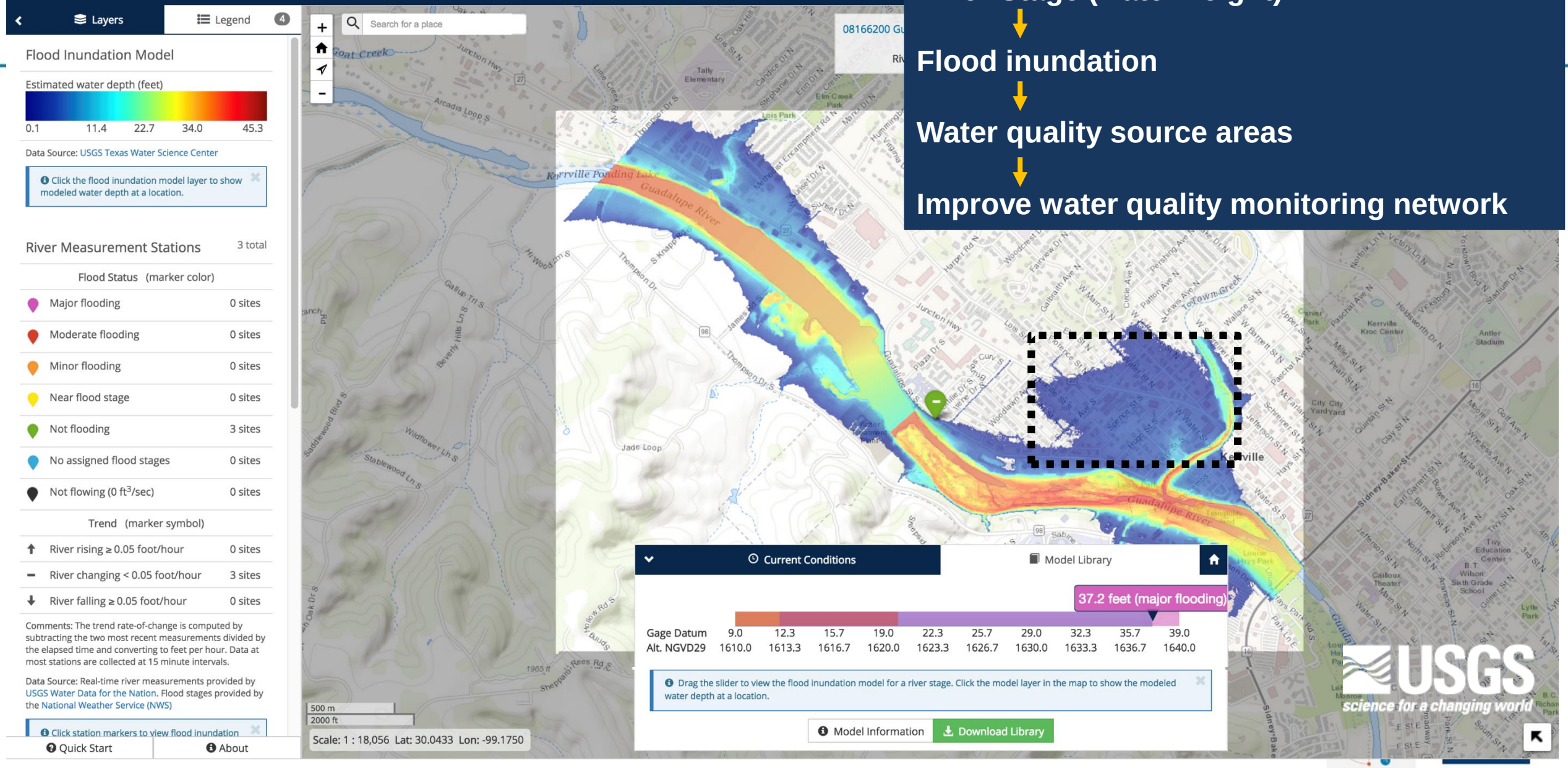
Flood inundation

↓

Water quality source areas

↓

Improve water quality monitoring network



Watershed Scale Decision Support: Water-Quality Data and Urban Flooding

IMPACT:
Improved surface water quality and planning for drainage capacity; data granularity

OUTCOME:
Improved treatment capacity in watersheds (catchments) of interest

CAPACITY & INSTITUTIONAL STRENGTHENING
Helps the implementing agency for medium-and-long term planning for water-quality impacts due to flooding and provides local people for awareness

Focused climate resiliency for ***urban corridors***

Improve flood risk planning through ***data acquisition and management***

Rehabilitate flood infrastructure using ***water-quality as a proxy***

https://webapps.usgs.gov/lake_houston/viewer/

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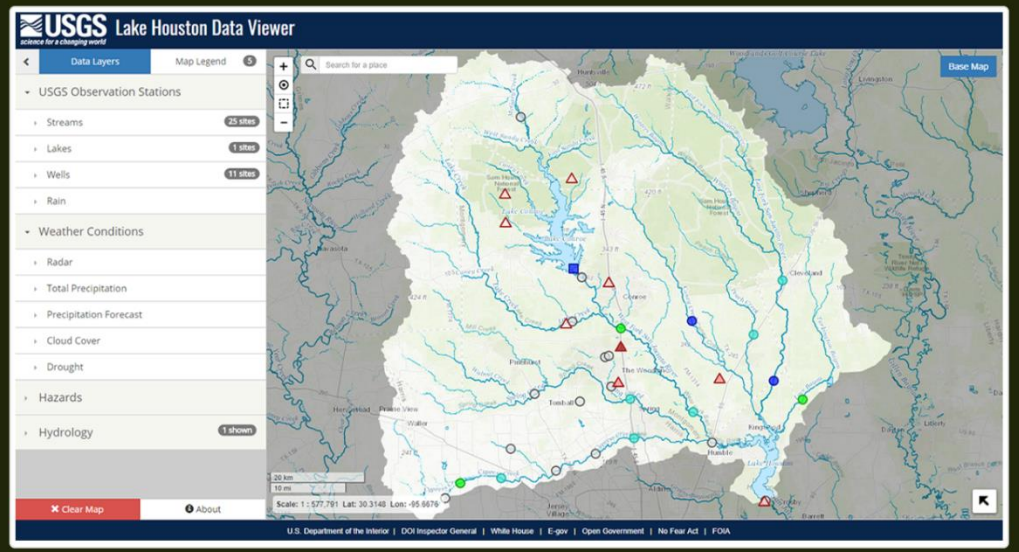

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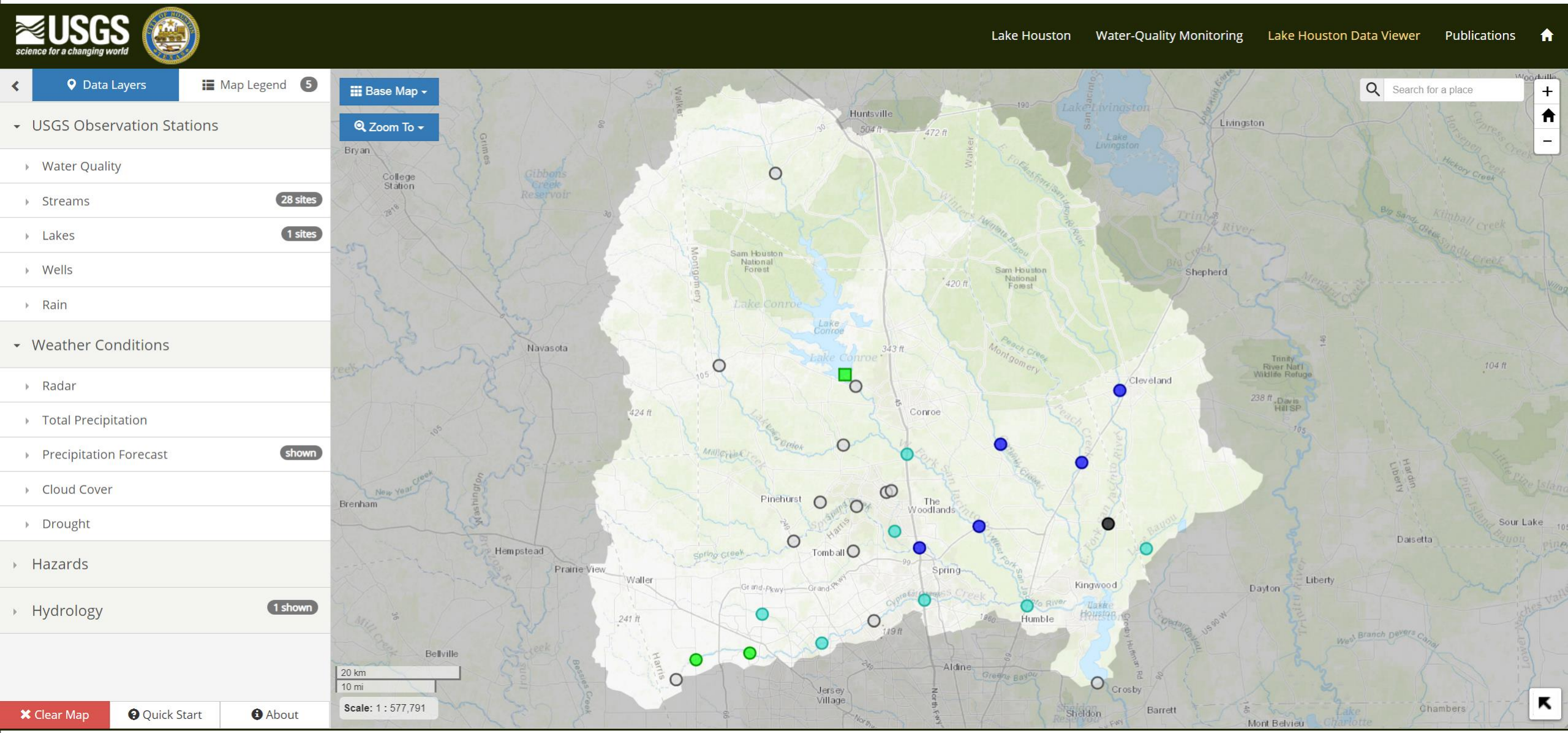
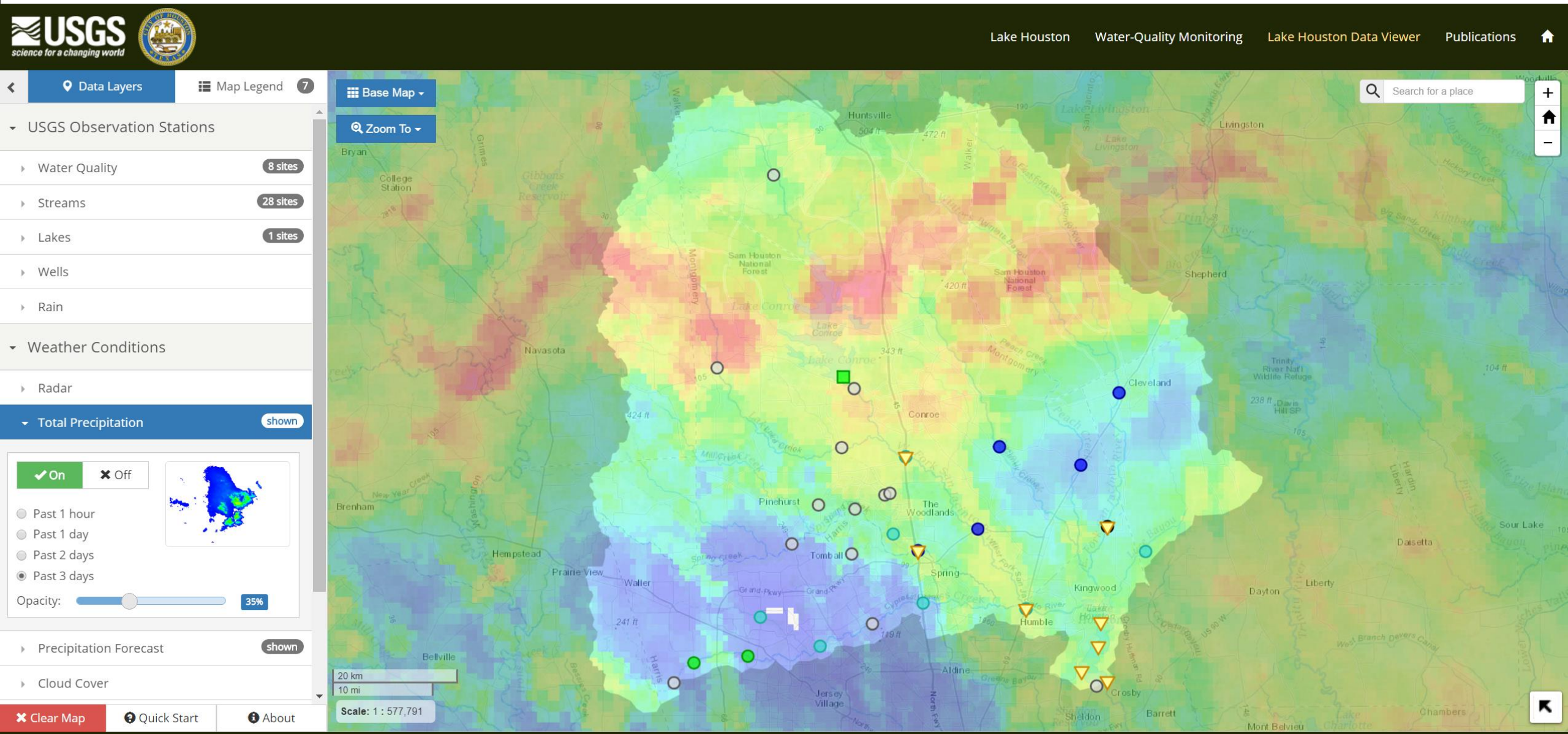
Current Conditions in the Watershed



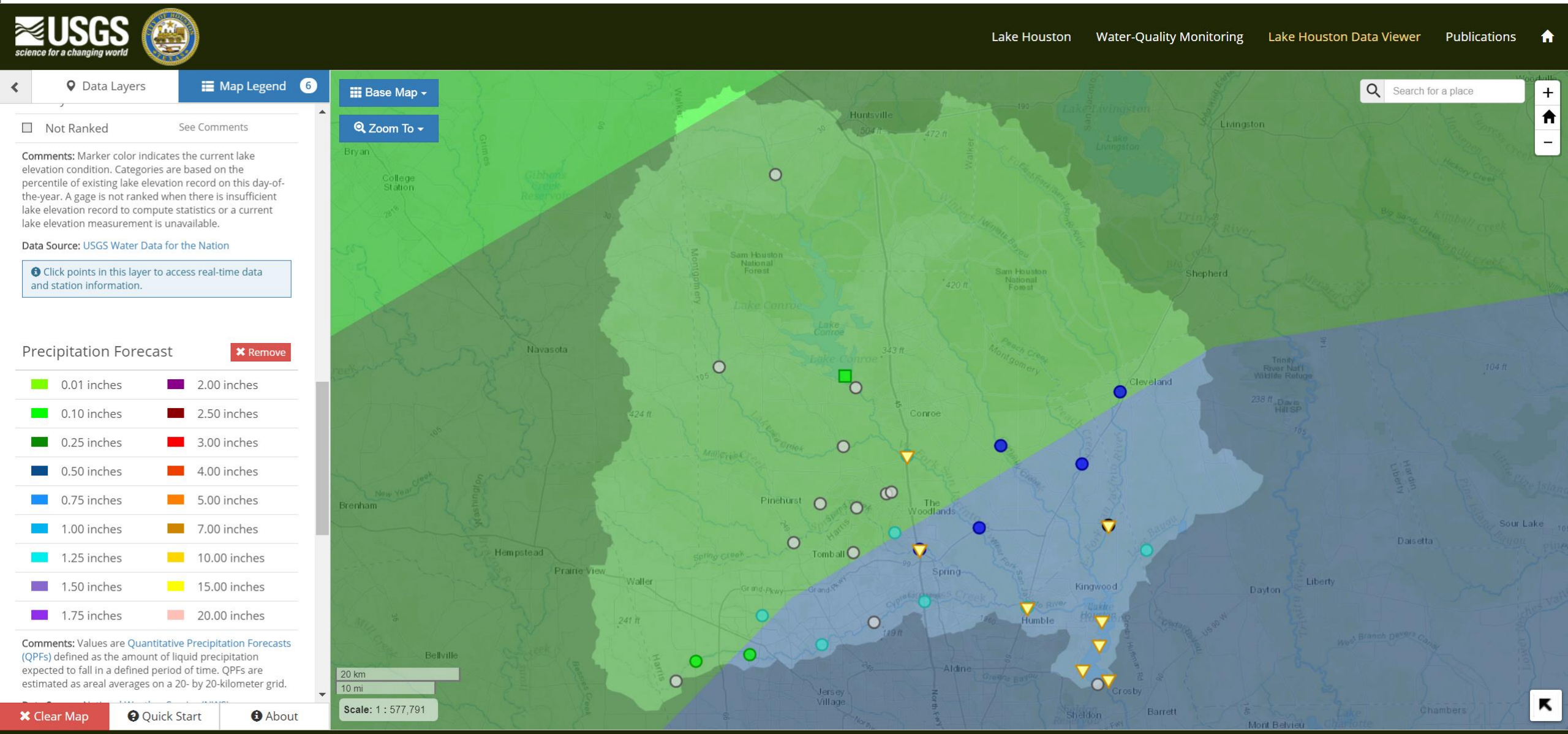
https://webapps.usgs.gov/lake_houston/viewer/

Total Past Rainfall



https://webapps.usgs.gov/lake_houston/viewer/

Rainfall Forecast



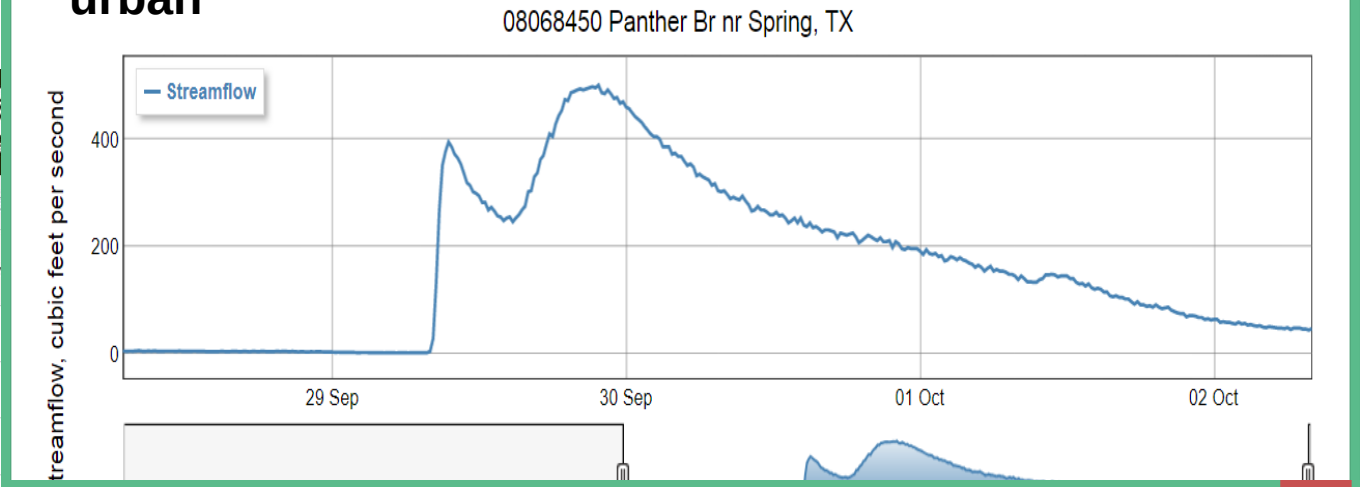
https://webapps.usgs.gov/lake_houston/viewer/

Conditions

USGS - GWIS Plot Service - Google Chrome

https://txpub.usgs.gov/dss/gwis/0.0/services/plot?range_selector=true&date_window=15&controls=full_screen,full_range,y_fi...

urban



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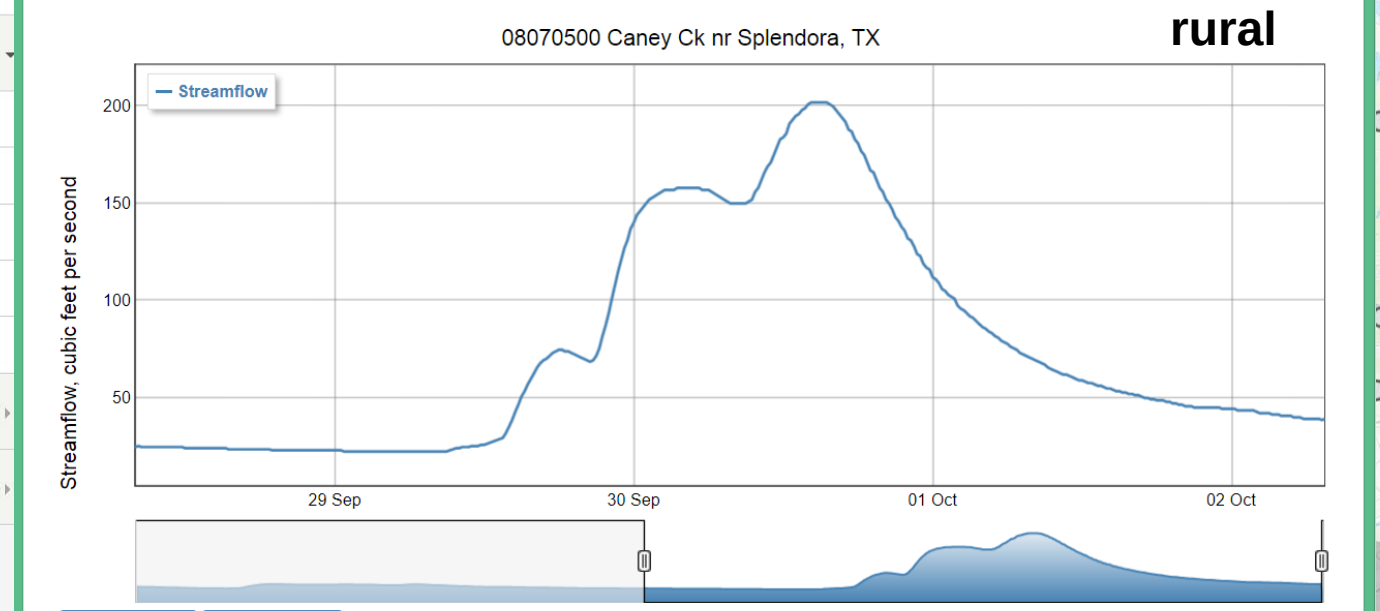
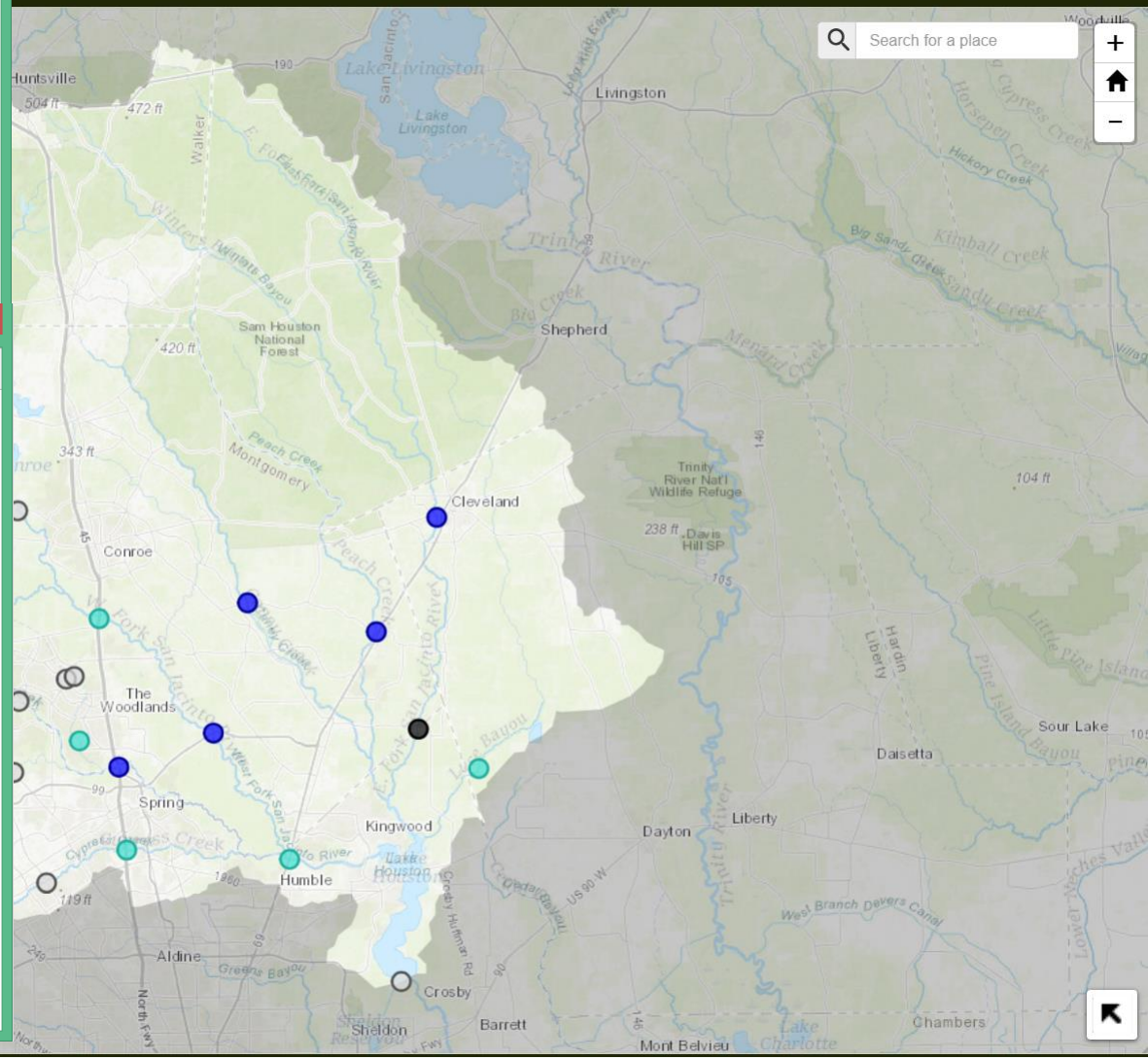
https://txpub.usgs.gov/dss/gwis/0.0/services/plot?range_selector=true&date_window=15&controls=full_screen,full_range,y_fi...

rural



View Full Screen | Zoom Full Range | Fixed y-scale | Y-axis logscale | Show y=0 | Show x-grid | Show y-grid

Lake Houston | Water-Quality Monitoring | Lake Houston Data Viewer | Publications



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