Central Indiana Water Study

Kick-off Meeting

April 29, 2019

DNR
Indiana Department of Natural Resources

DIVISION OF WATER

An Overview of Indiana's SWWF Registration and Water Use Reporting Program

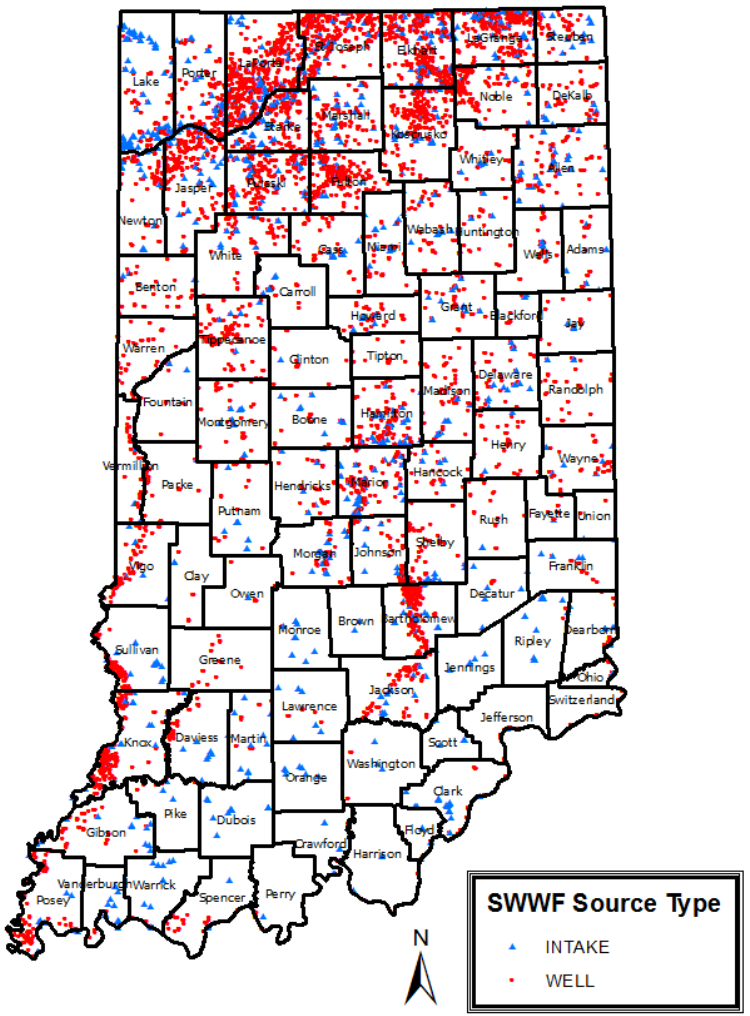
IFA Central Indiana Water Study Kick-off Meeting

April 29, 2019

IC 14-25-7: Water Resources Management Act

- Enacted in 1983
- Requires registration of all SWWF (gw & sw)
- Facility defined as greater than 100,000 GPD capability
- Capability is aggregate of all wells & intakes
- Annual water use reporting required
- Approximately 4100 SWWFs currently registered

Significant Water Withdrawal Facility Source Locations in Indiana

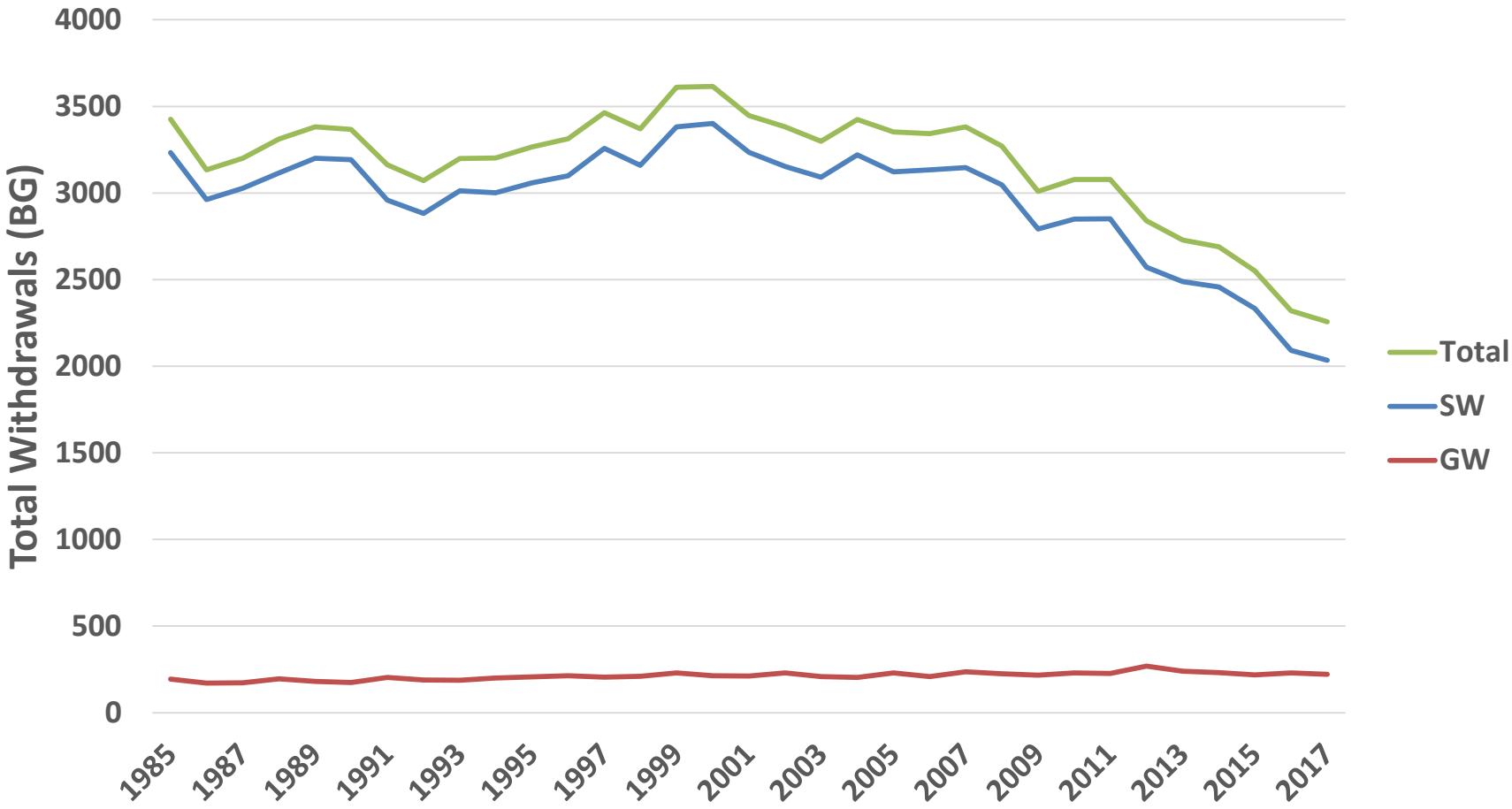


2017 Indiana Registered SWWFs

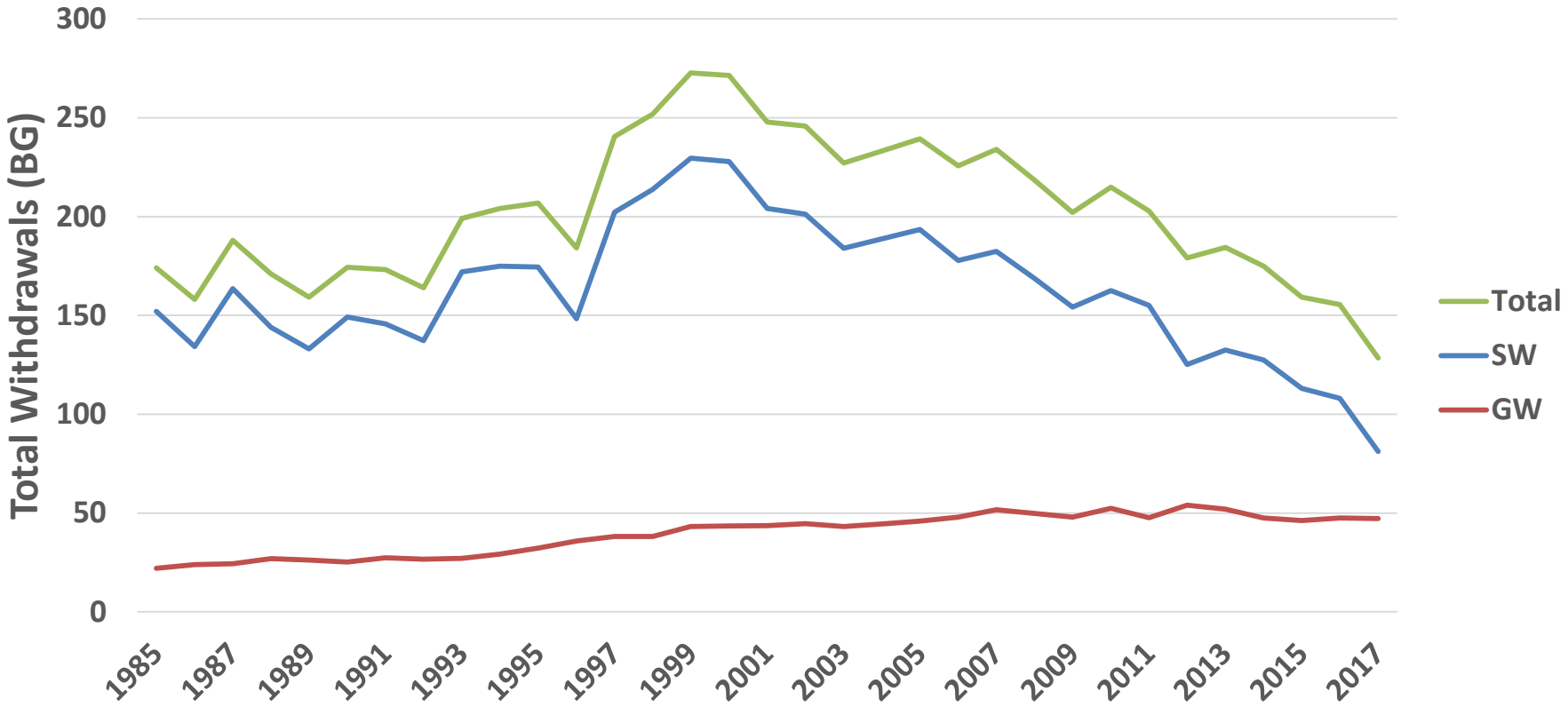
Water Use Code	Number of Facilities	Number of Wells	Number of Intakes
EP	92	259	95
IN	378	688	291
IR	2767	3786	805
MI	135	234	51
PS	706	2182	64
RU	58	145	12
TOTAL	4136	7294	1318

2017 State Totals				
	Withdrawals (BG)	Capacity (MGD)	Withdrawals vs Capacity	Current Number
Surface Intakes	2033	17610	31.6%	1318
Wells	222	6035	10%	7294
TOTAL	2255	23645	26.1%	8612
Facilities				4136

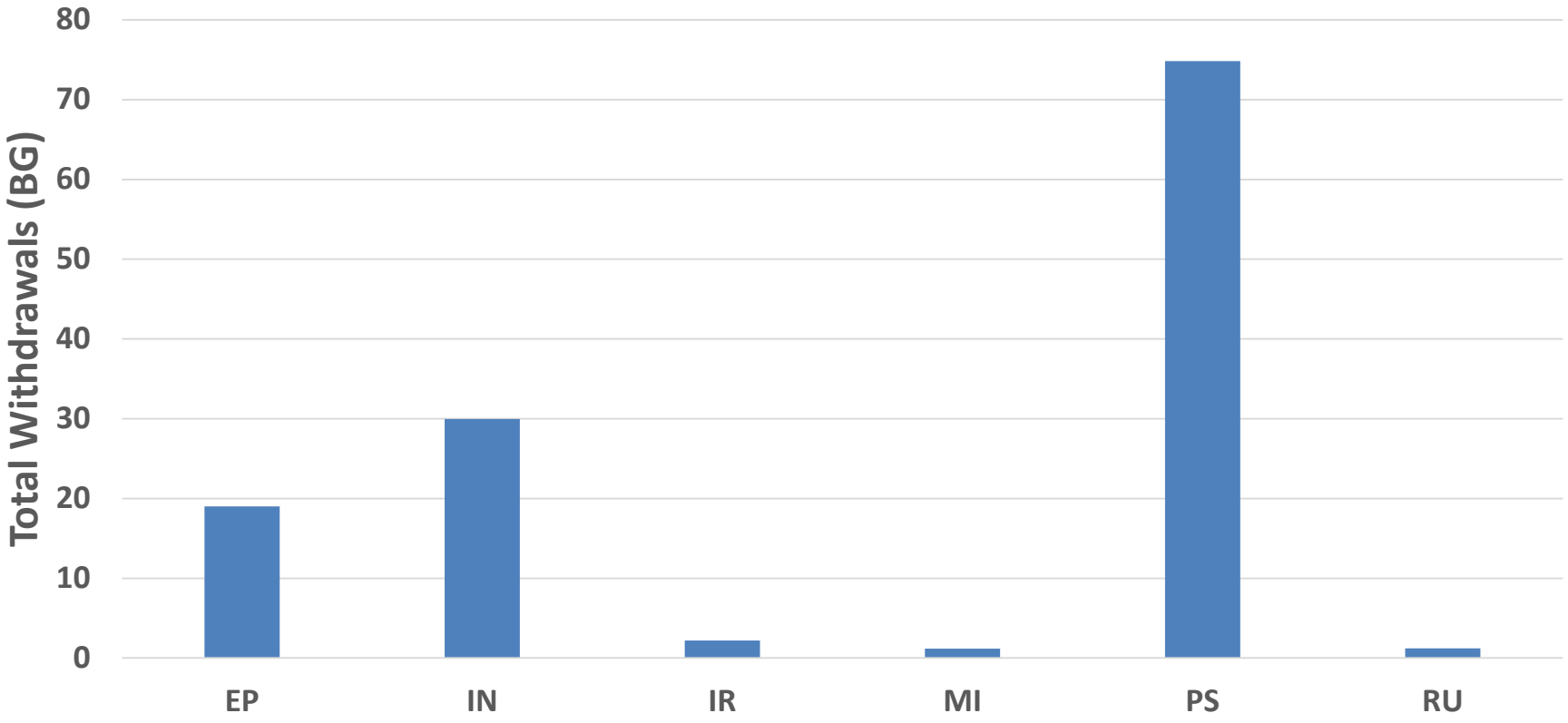
Total Annual Withdrawals 1985-2017



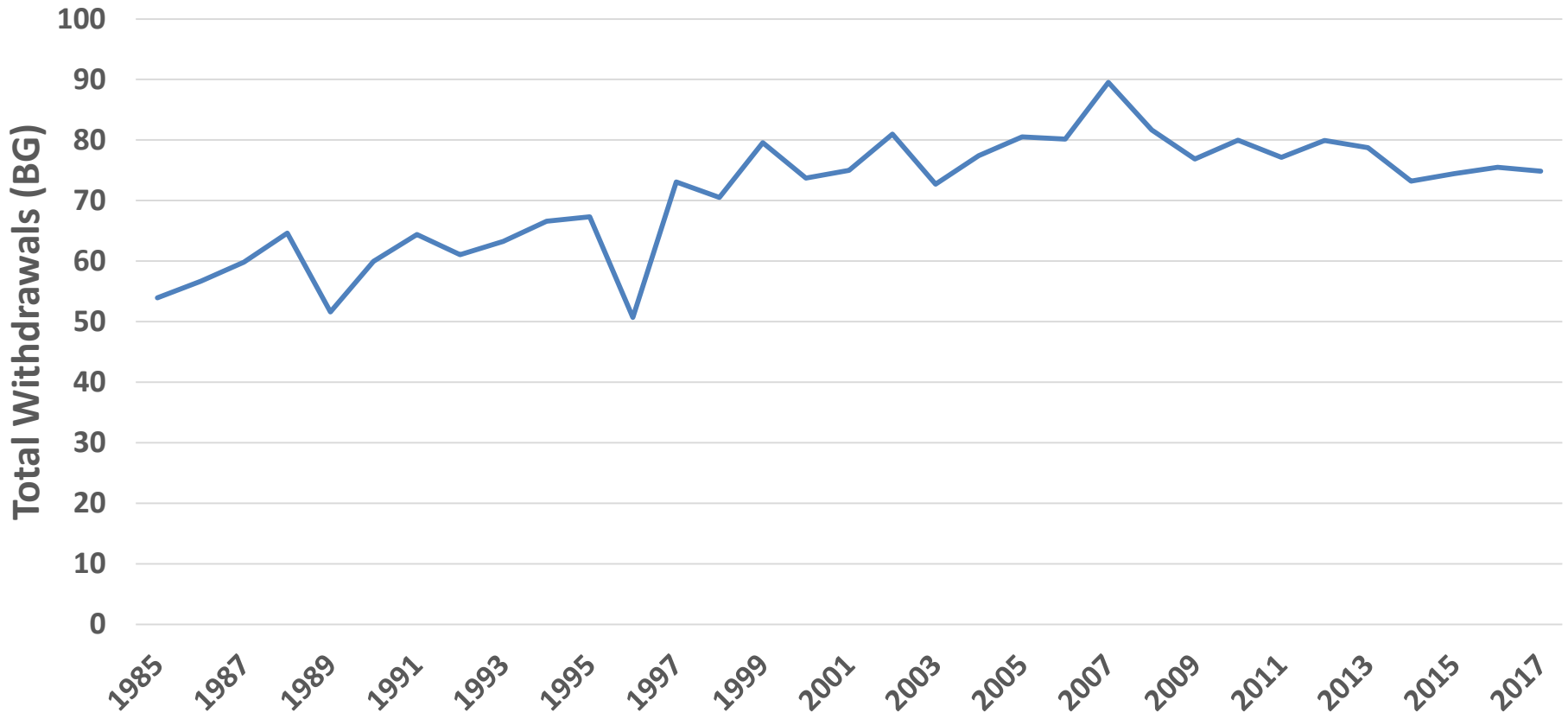
Total Annual Withdrawals- Central IN Region 1985-2017



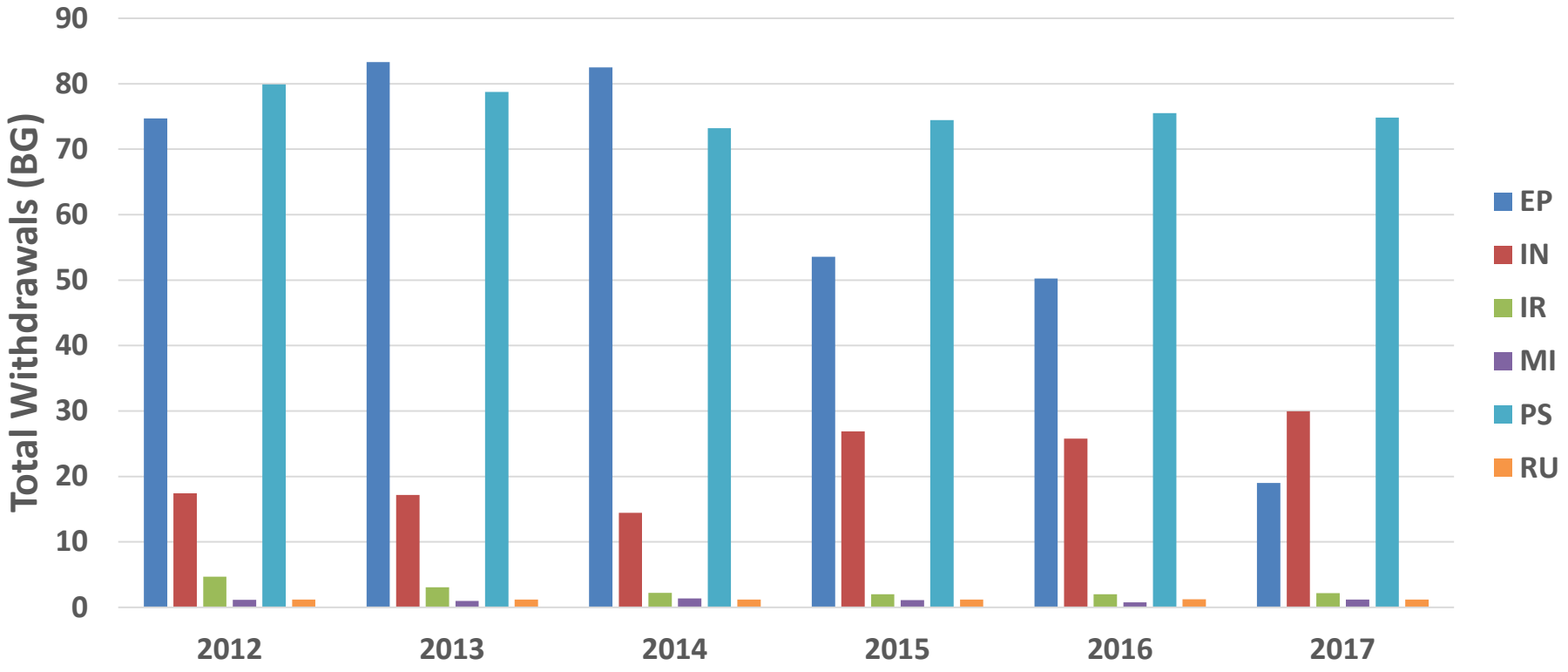
2017 Withdrawals by MWU Code- Central IN Region



Total Annual Withdrawals- Central IN Region Public Supply 1985-2017



Withdrawals by MWU Code 2012-2017
Central IN Region



For More Information Regarding Indiana's
SWWF Registration and Water Use Program

DNR Indiana Department of Natural Resources

Allison Mann
almann@dnr.in.gov

Climate
Trends, Extremes, and Variability

in Central Indiana

Beth Hall

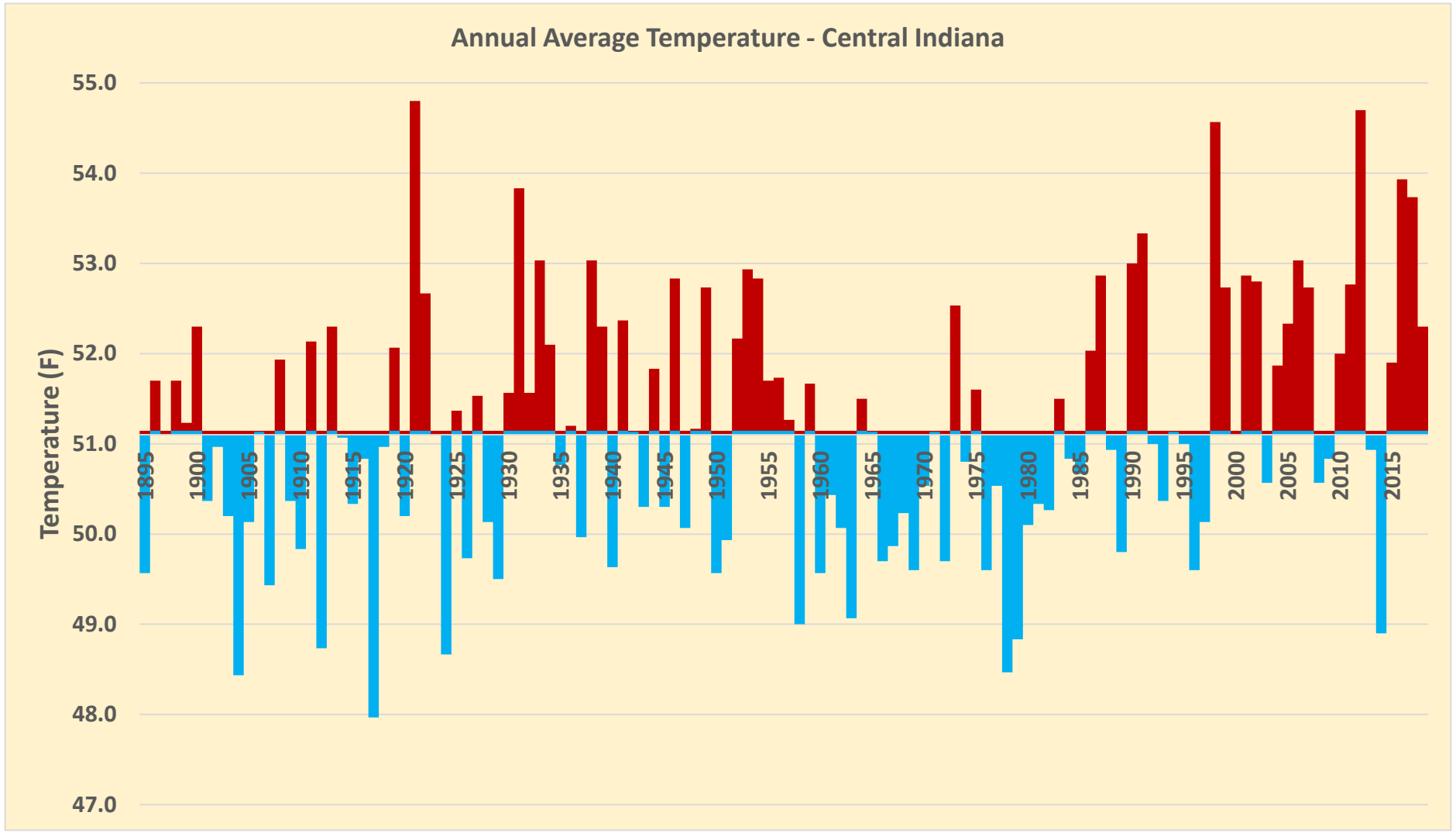
Director, Indiana State Climate Office

Purdue University

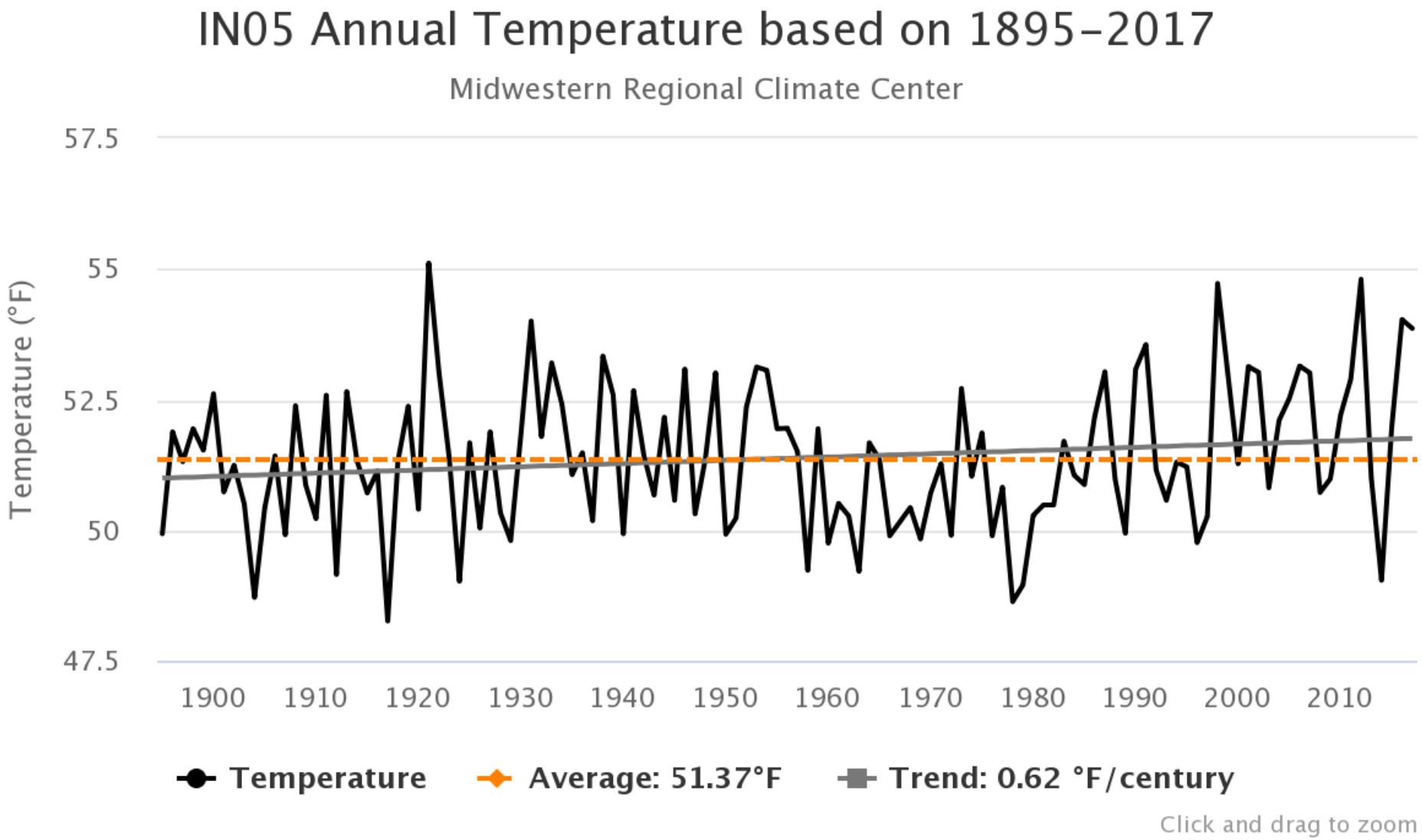
April 2019

Indiana Climate Divisions

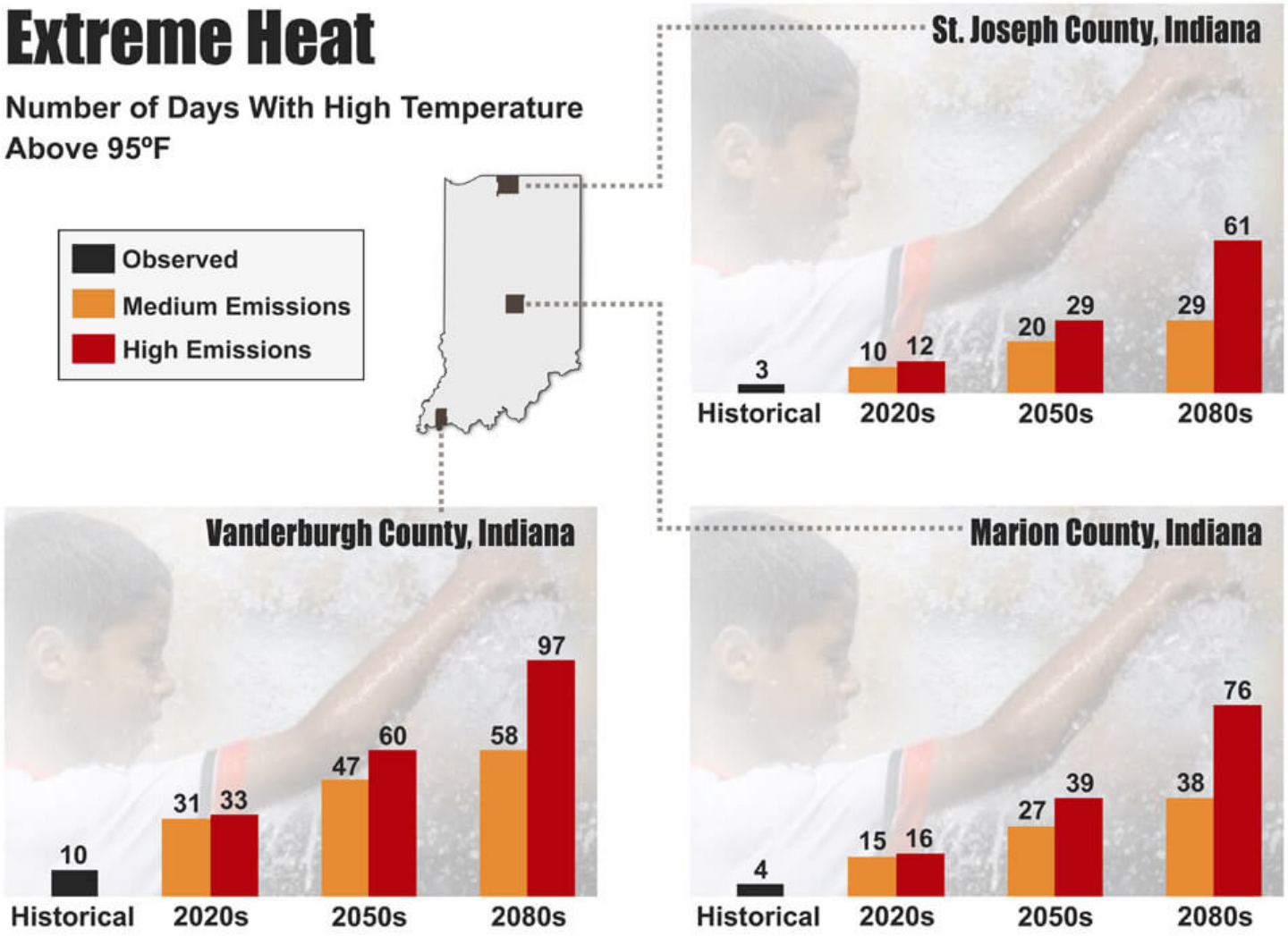
Average Annual Temperature



Average Annual Temperature



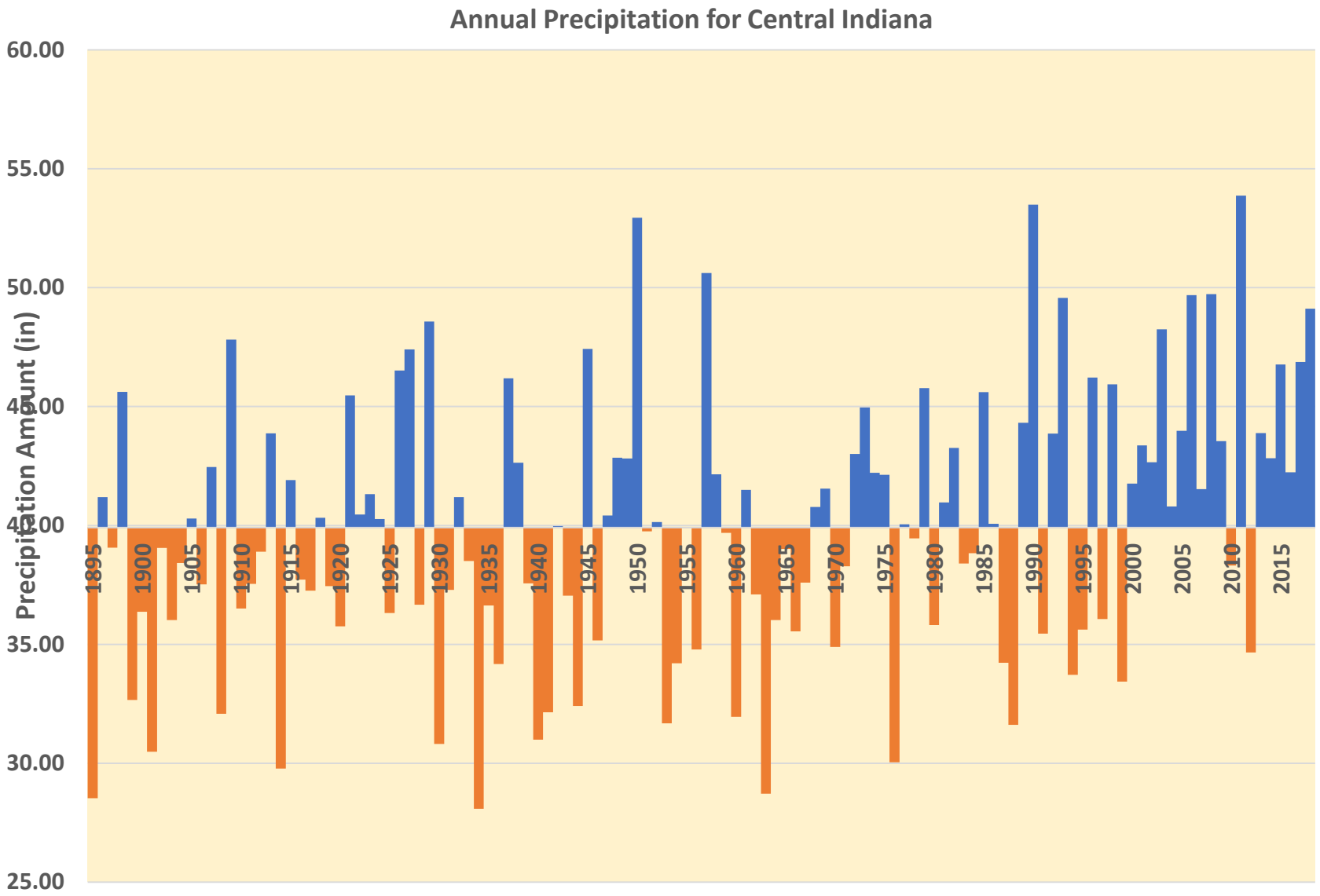
Extreme Heat



"Historical" is an average for the period 1915 to 2013. "2020s" represents the average 30-year future period 2011 to 2040. "2050s" represents the average 30-year period 2041 to 2070. "2080s" represents the 30-year period 2071 to 2100.

IN CCIA
Indiana Climate Change Impacts Assessment

Average Accumulated Precipitation



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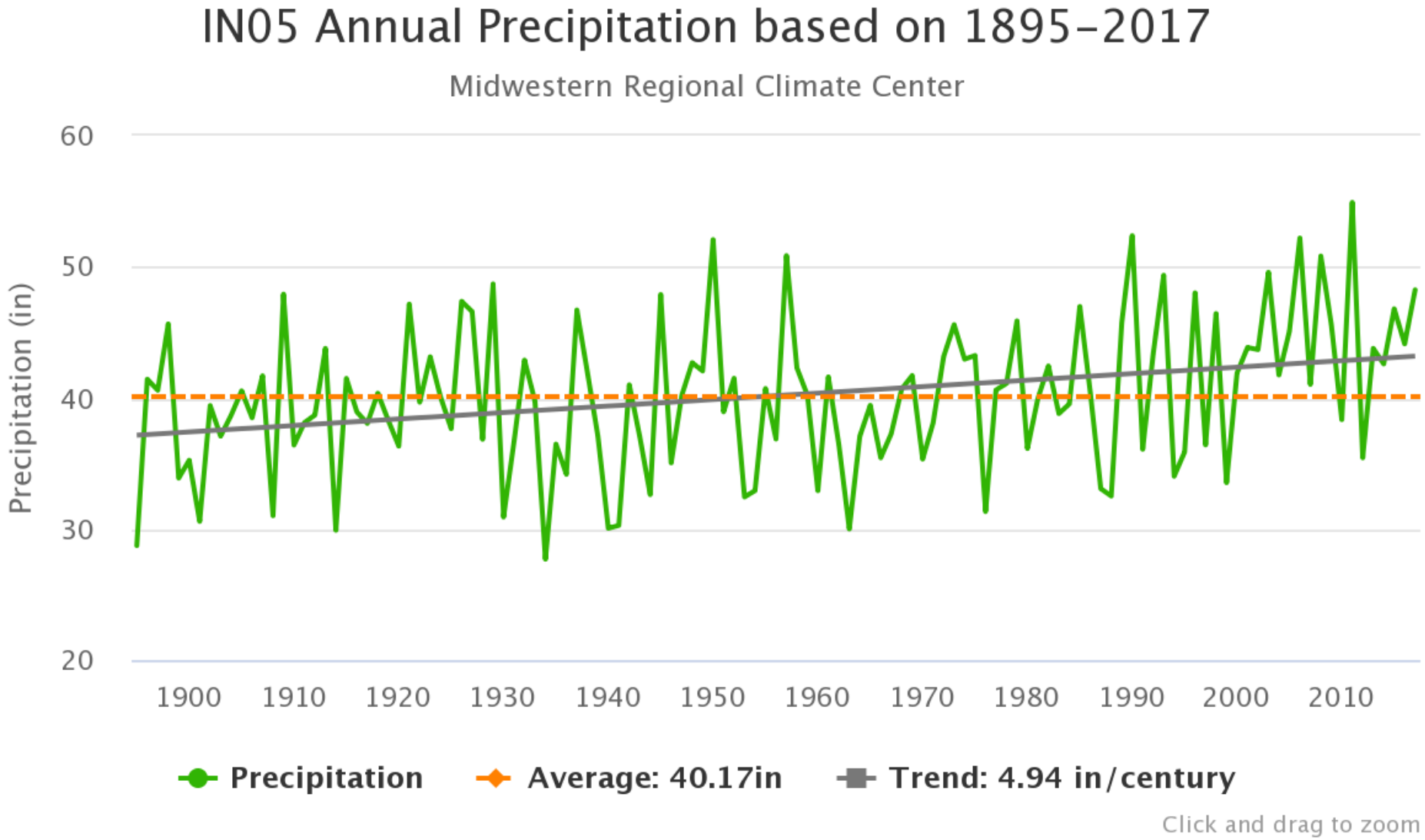

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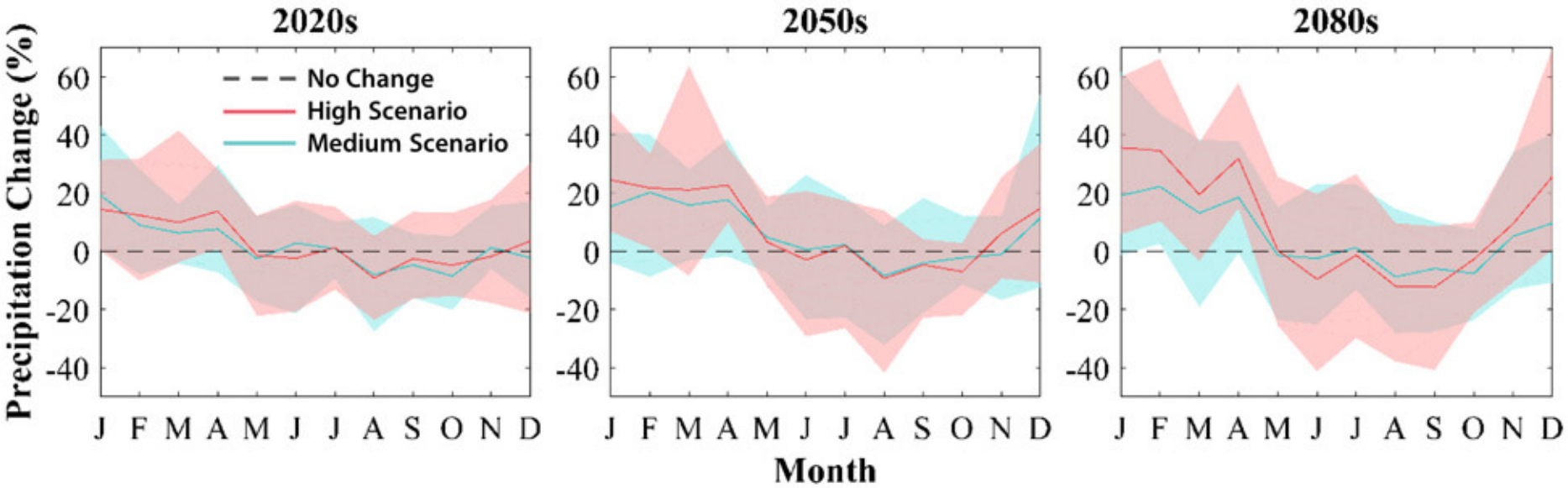
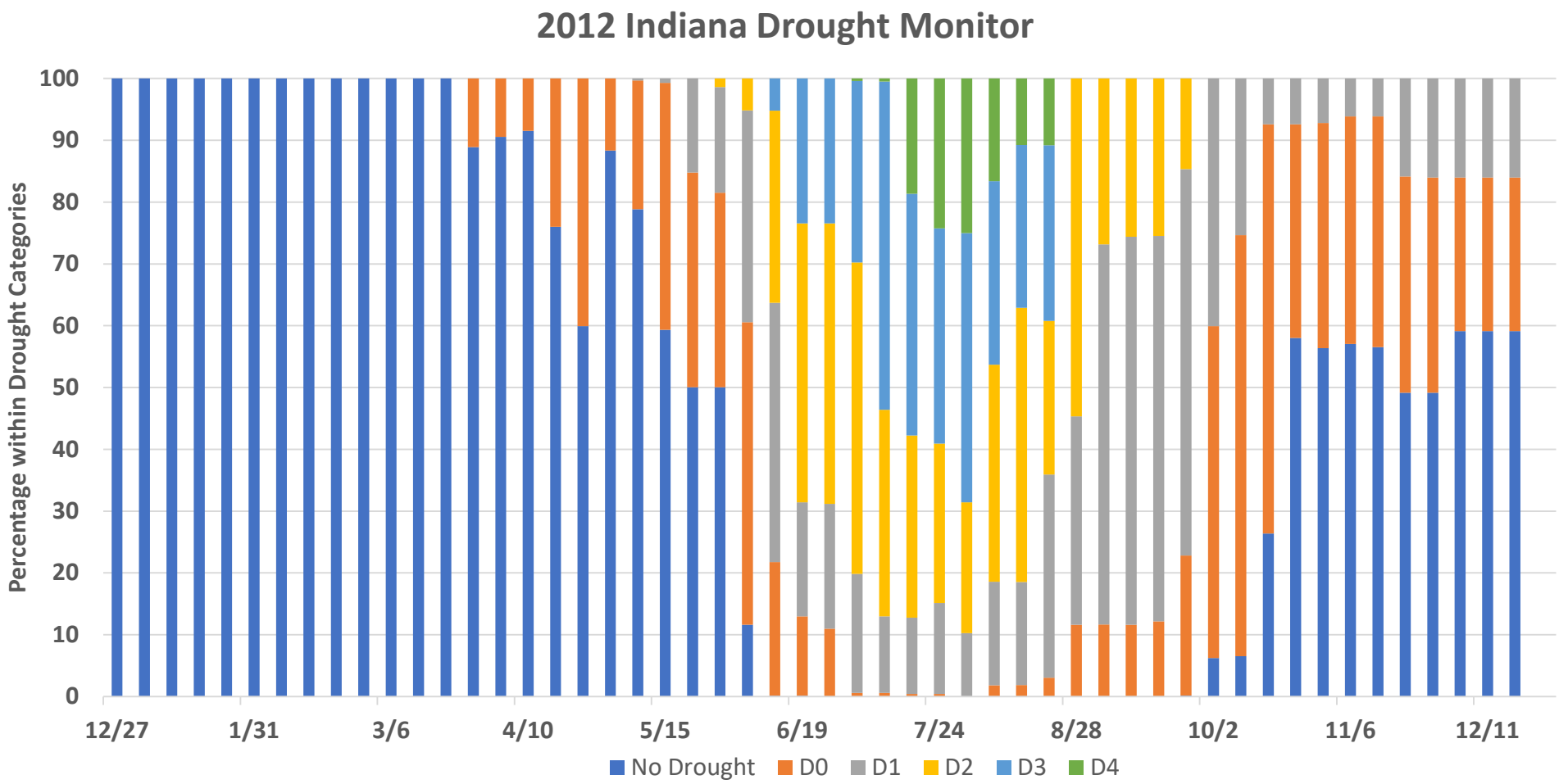


Shaded areas indicate range of uncertainty

Drought / Flood Variability



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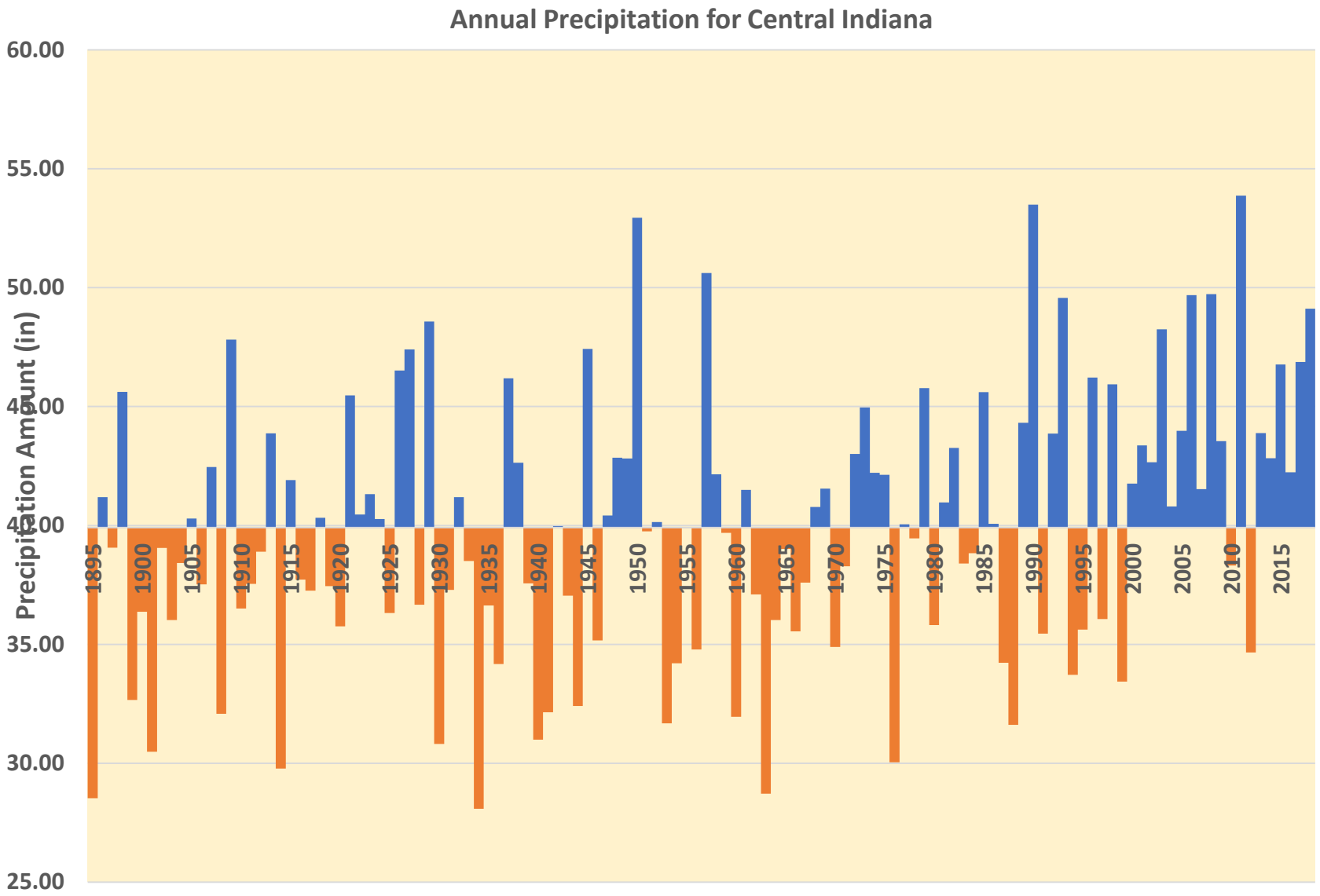
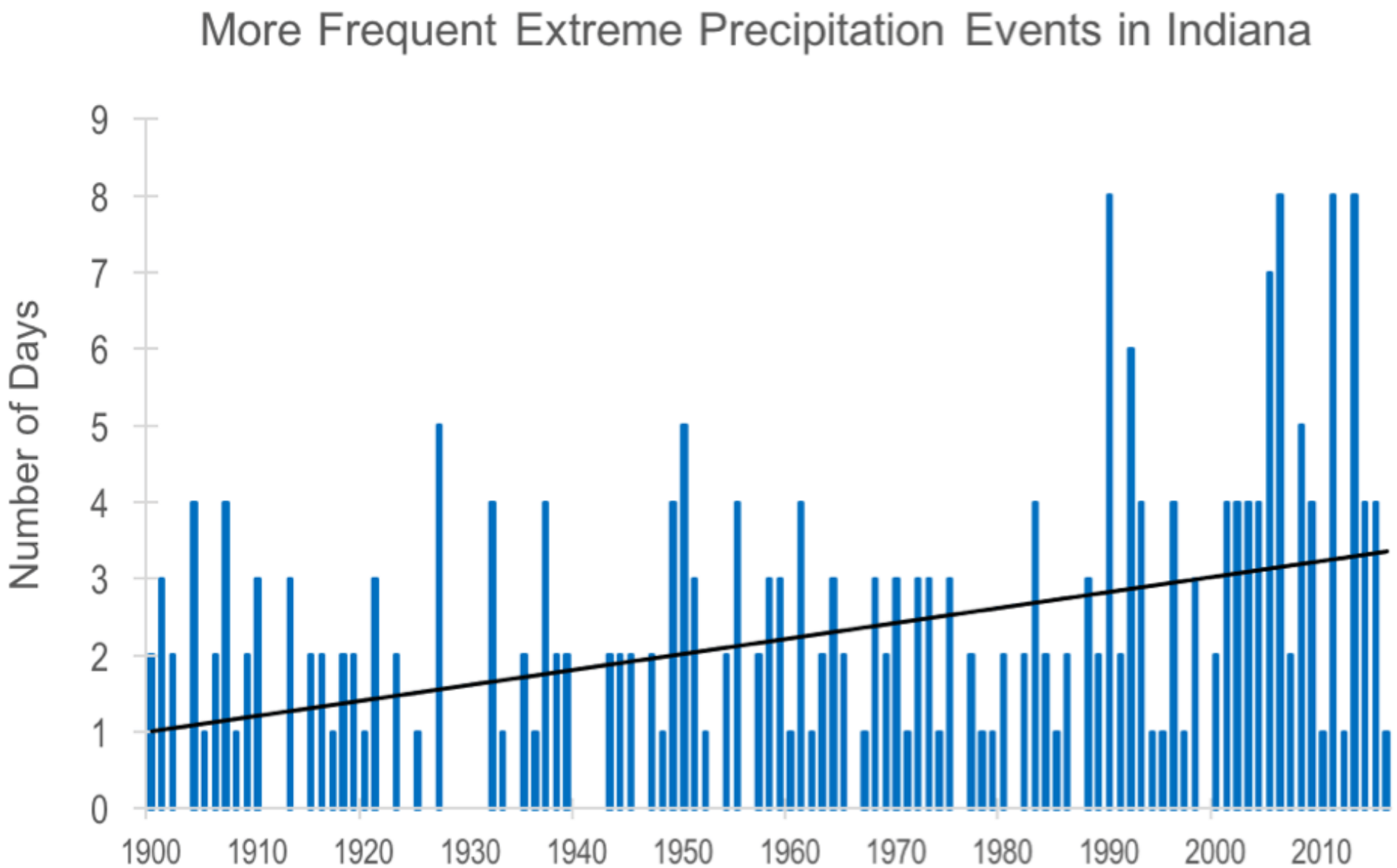
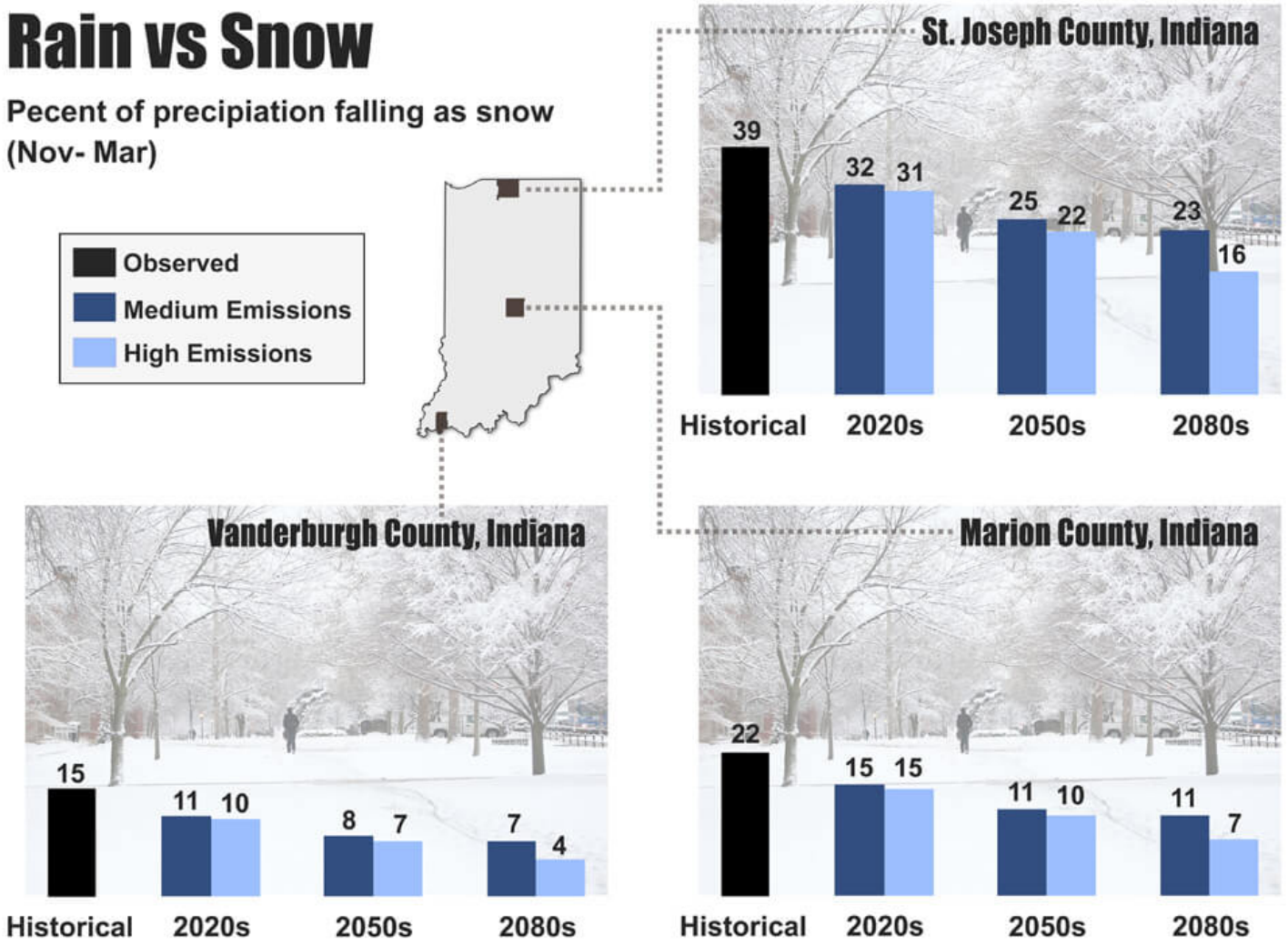


Extreme Precipitation Events



Number of days that exceed the 1900-2016 period's 99th percentile. Trend is 0.2 days/decade. Source: MRCC

Average Accumulated Precipitation



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IN CCIA
Indiana Climate Change Impacts Assessment

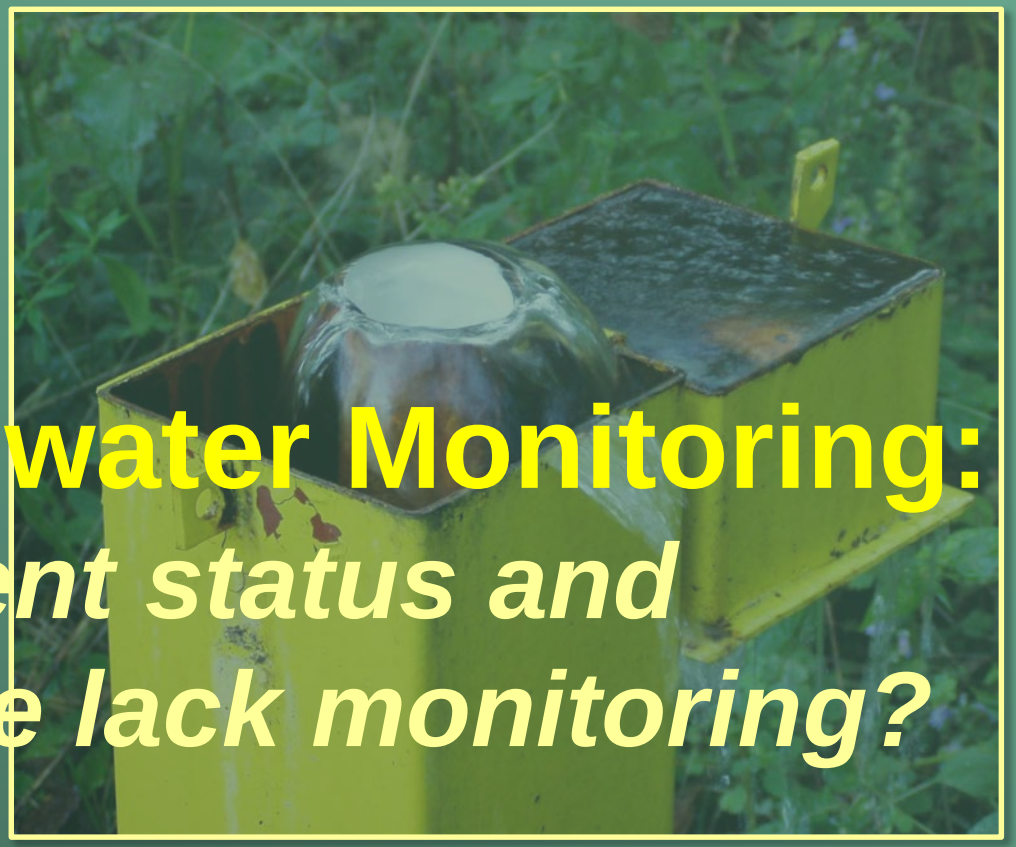
Questions?

Beth Hall

Director, Indiana State Climate Office

Purdue University

USGS
science for a changing world



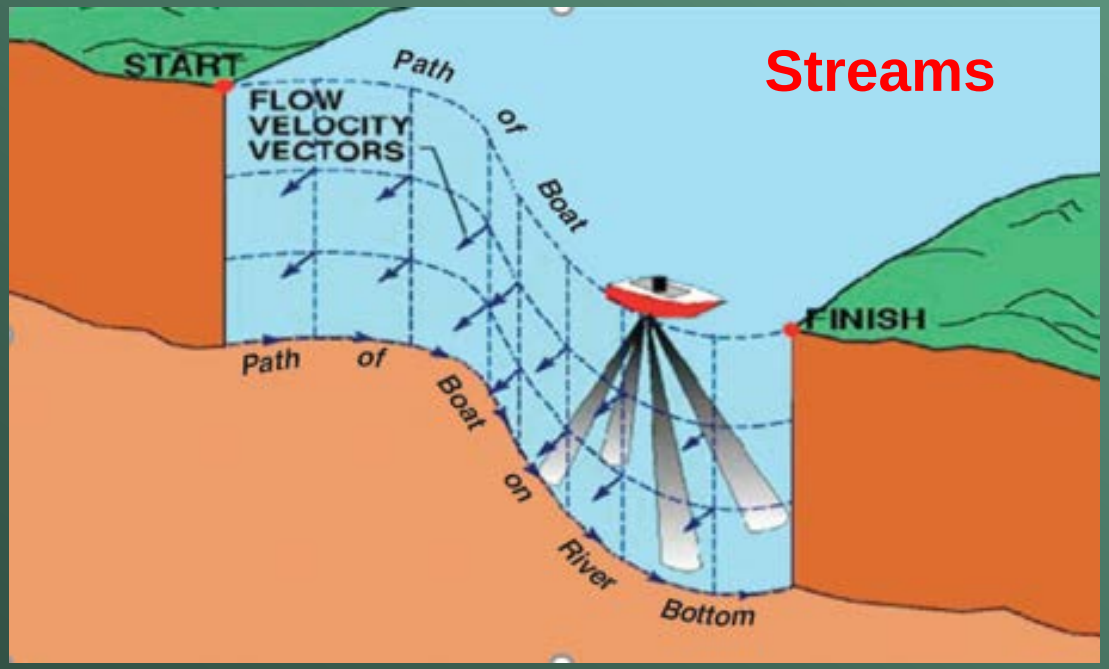
Indiana Groundwater Monitoring:
What is our current status and where do we lack monitoring?

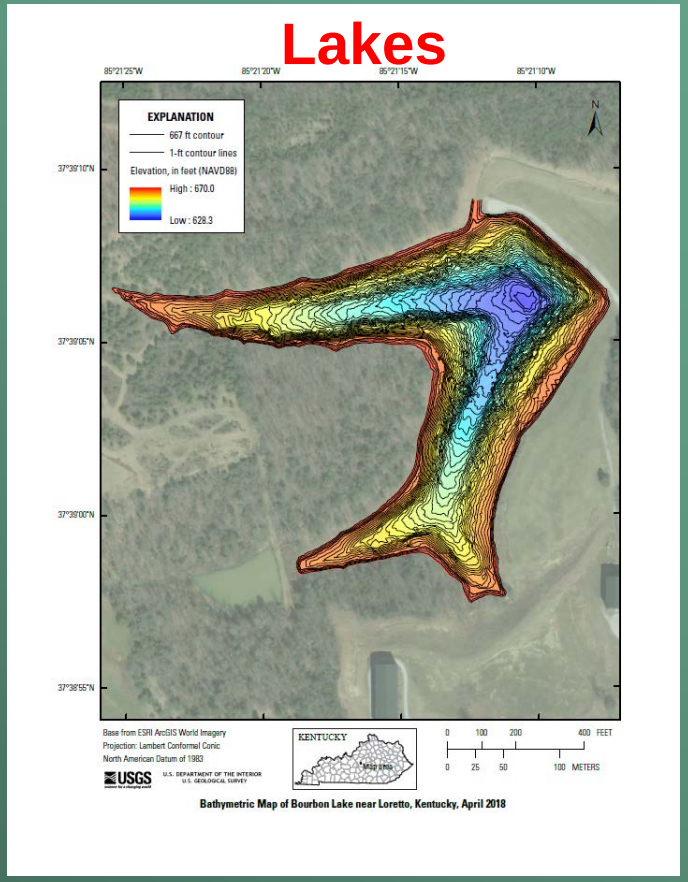
David Lampe, Randy Bayless, Jeff Frey

U.S. Geological Survey, Ohio-Kentucky-Indiana Water Science Center (OKI WSC)

U.S. Department of the Interior
U.S. Geological Survey

Determining the amount of water in streams or lakes is easy

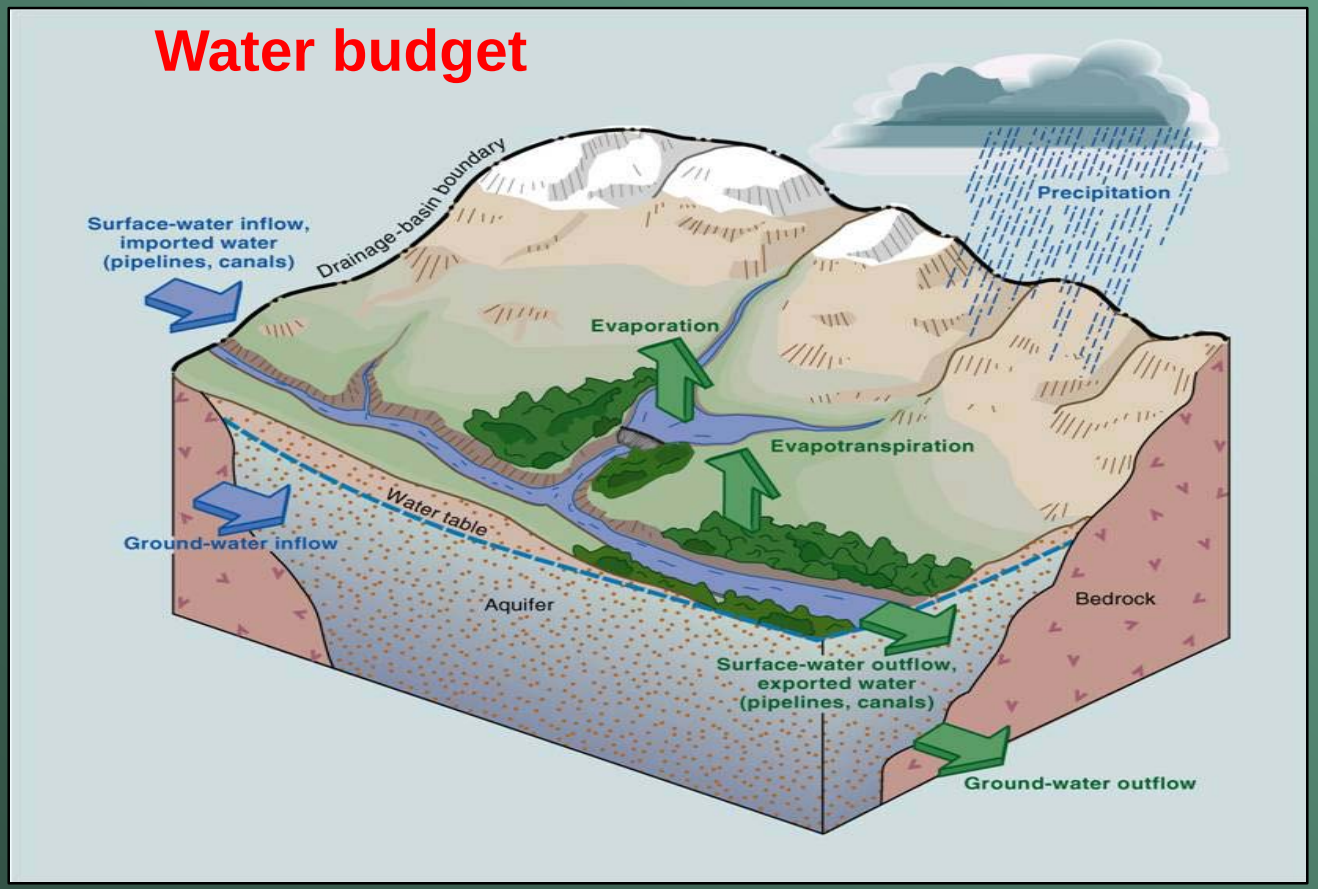




USGS

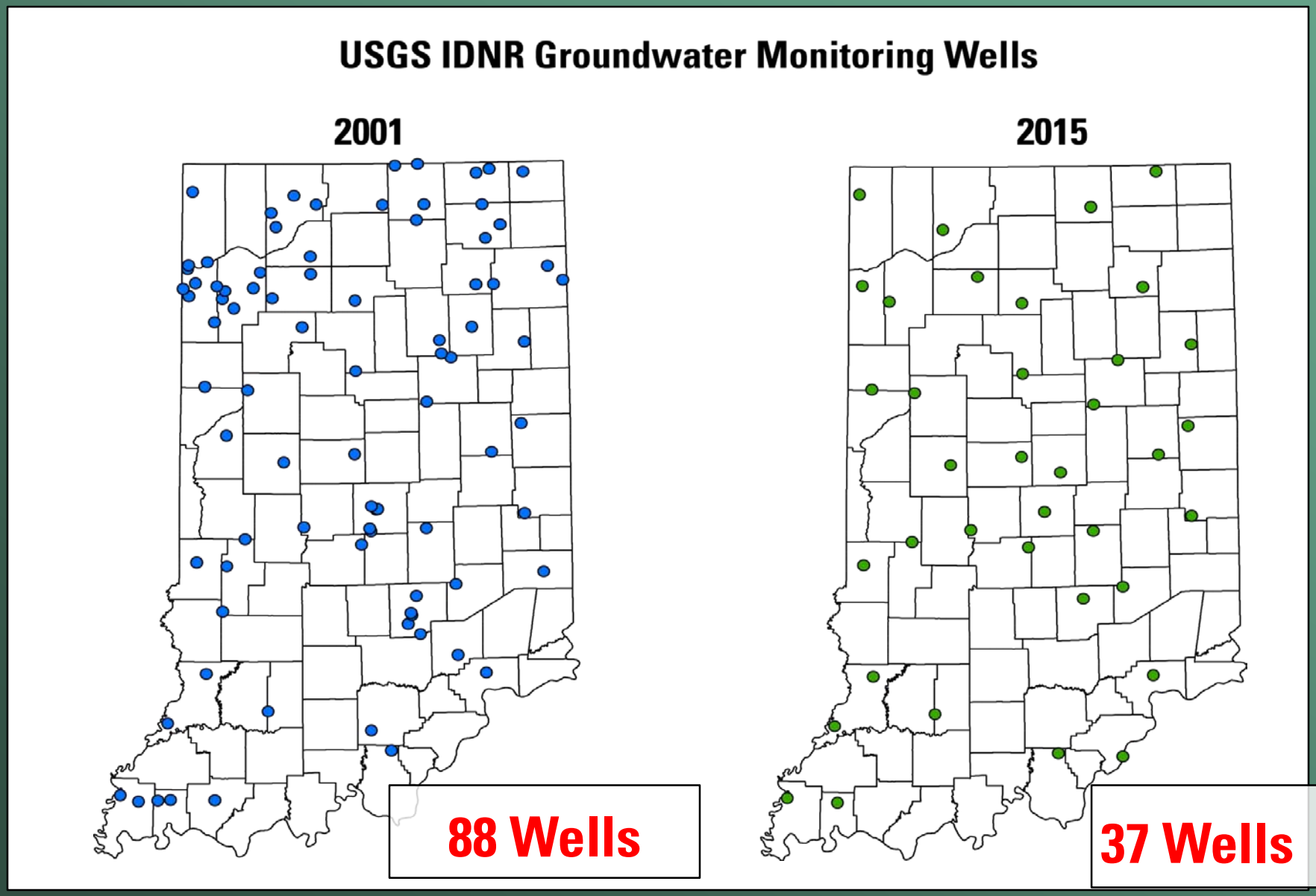
Determining the amount of water in aquifers is more difficult

- Groundwater level data and physical characteristics of the system are used to estimate the amount of water stored in the aquifer



USGS

Wells can tell us groundwater levels: they have decreased dramatically over time



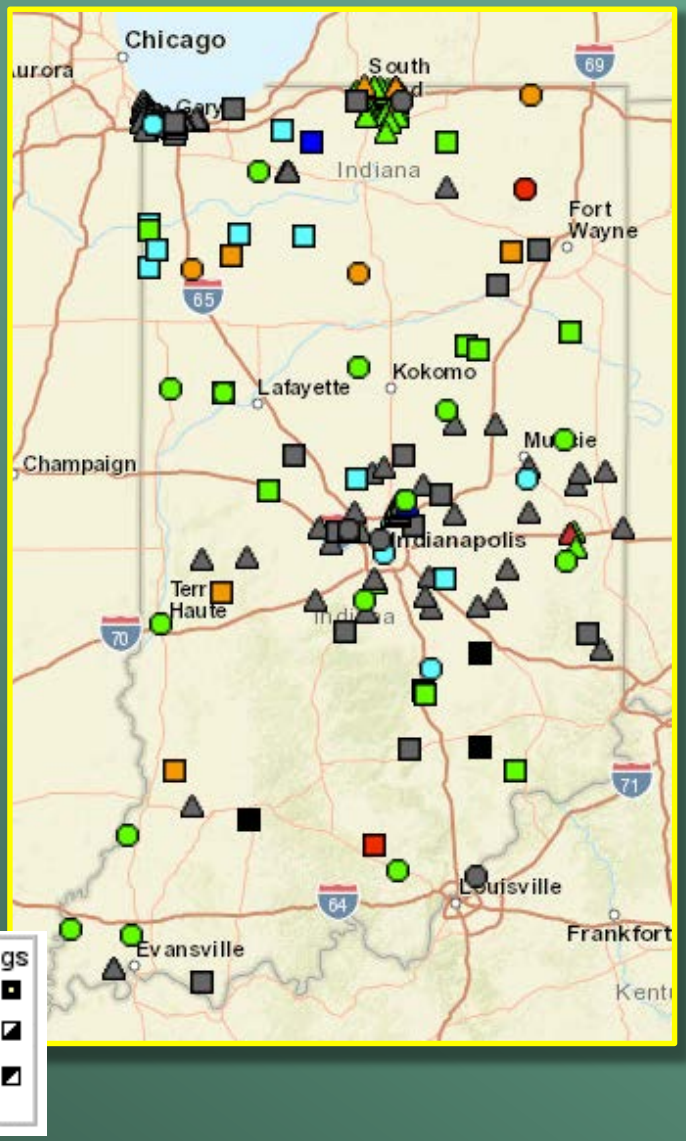
Types of Groundwater Data

- **Periodic Data:**
  - Occasional water level measurements
- **Continuous Data:**
  - Data recorded locally and downloaded periodically
- **Real-Time Data:**
  - Same as continuous, but data automatically on our website within a few hours

USGS

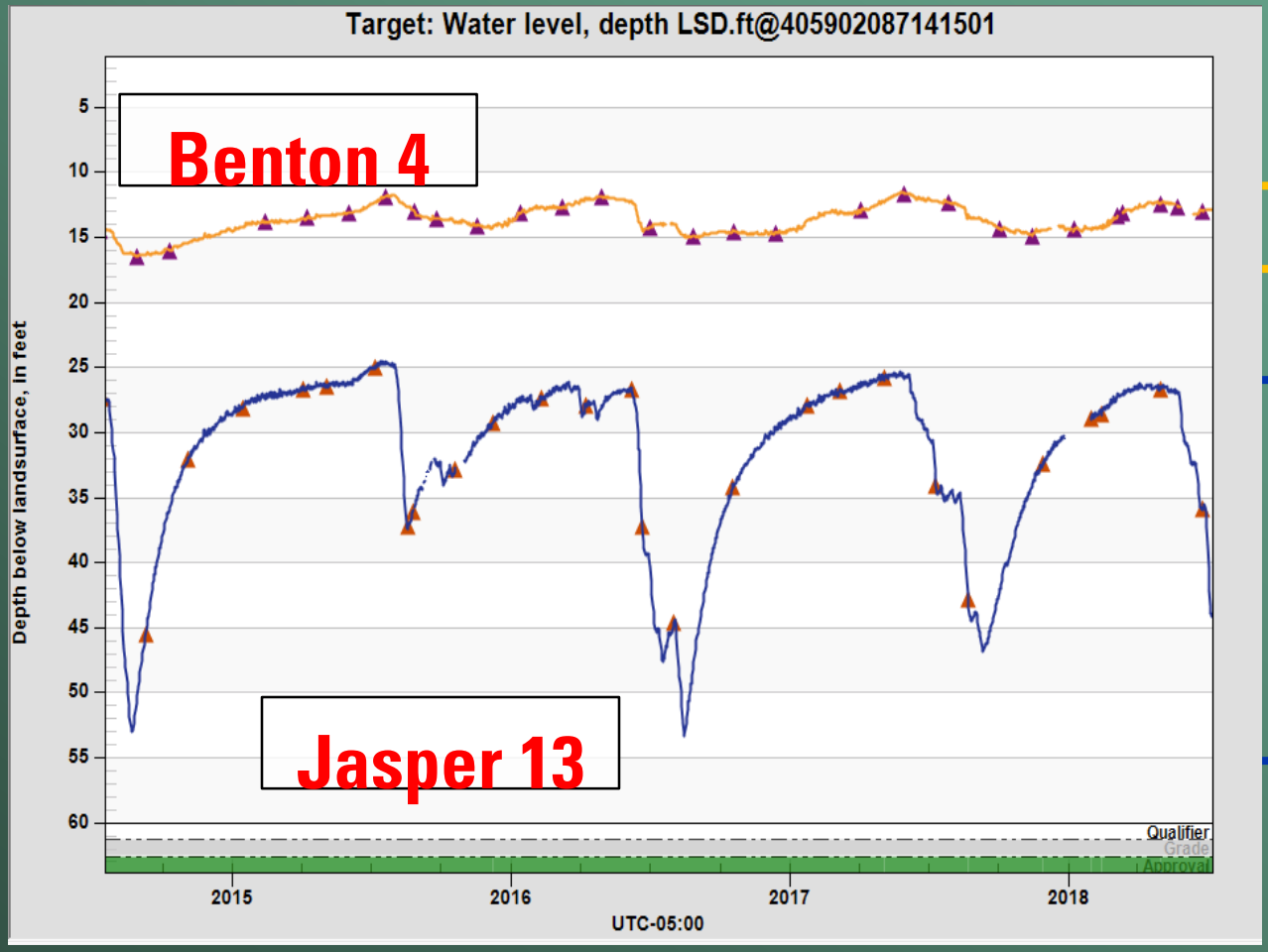
Current Indiana Groundwater Wells

- *103 Continuously* recording GW observation wells
  - 37 are near Real-Time
- Sub networks
  - Volunteer Monitoring Network
  - Climate Response Network
  - Periodic networks
    - Three county scale networks
  - National Water-Quality Assessment Program



USGS

Continuous groundwater monitoring can show seasonal changes

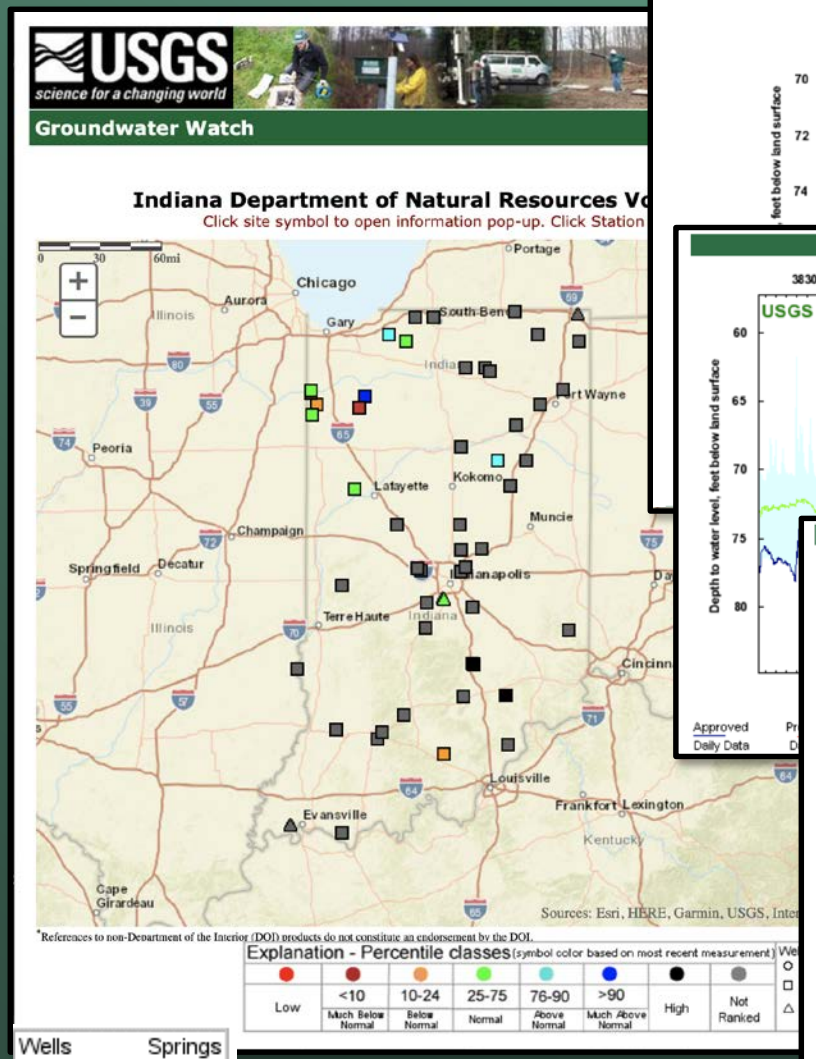


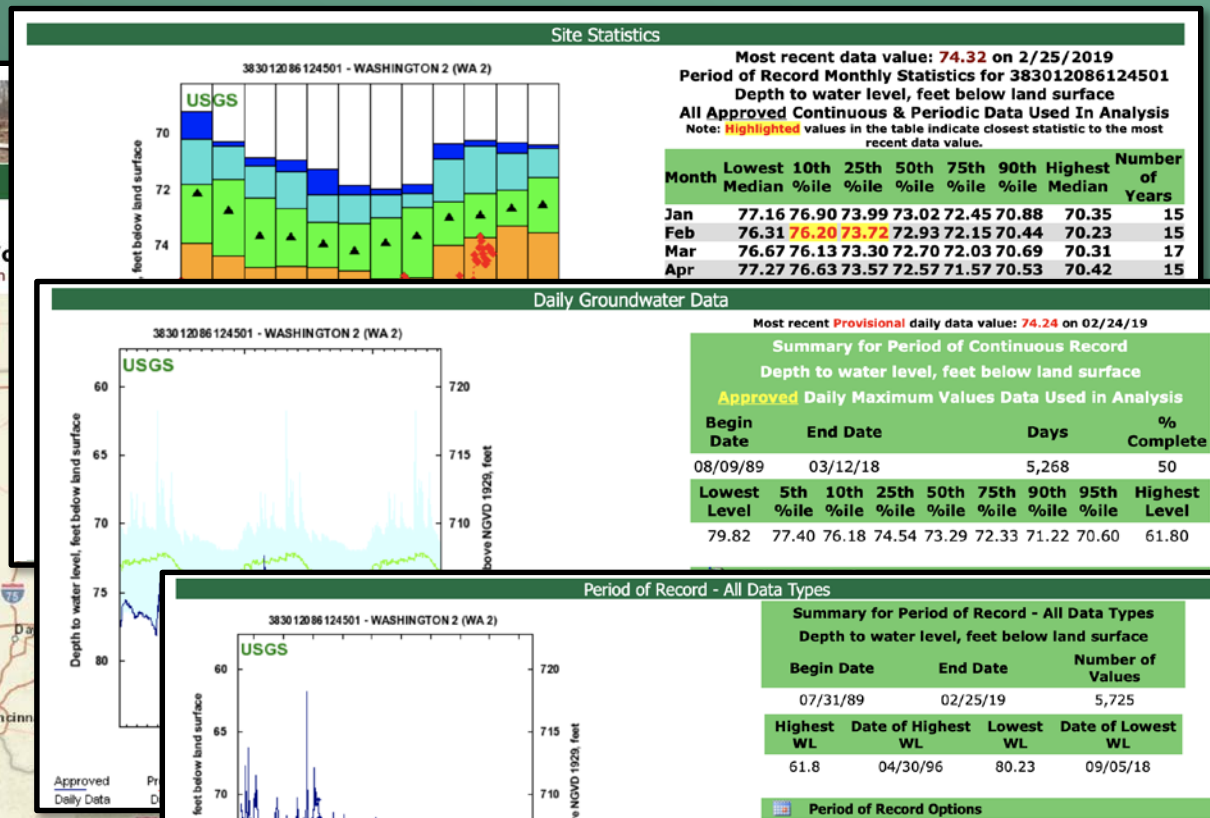
~ 4 feet

20 -25 feet

USGS

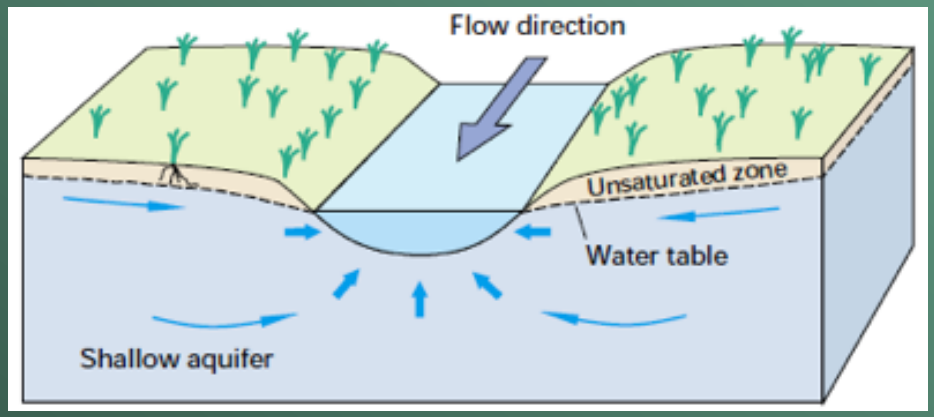
USGS Active GW Network portal



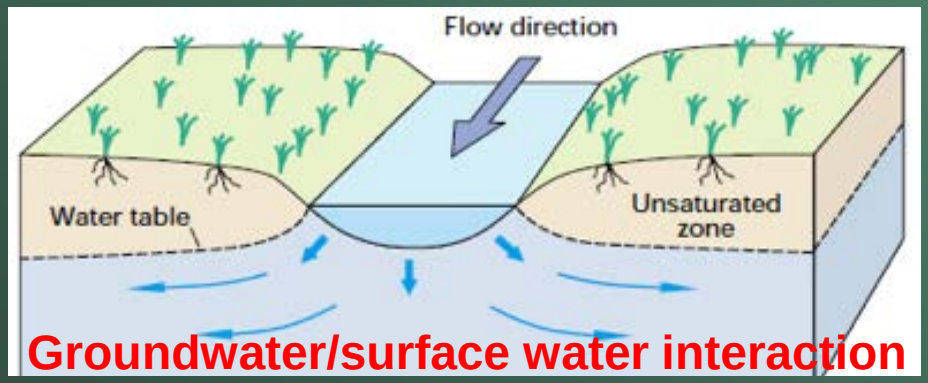


https://groundwaterwatch.usgs.gov/netmapT4L1.asp?ncd=IDV

Stream water levels are representative of groundwater conditions during base flows



Recharge

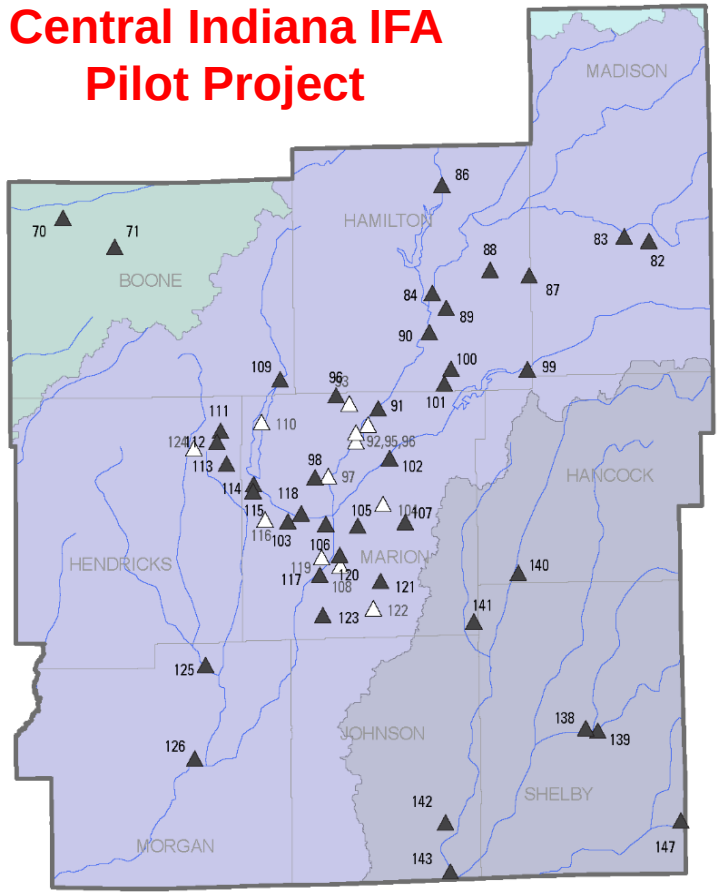


Groundwater/surface water interaction

Discharge

USGS

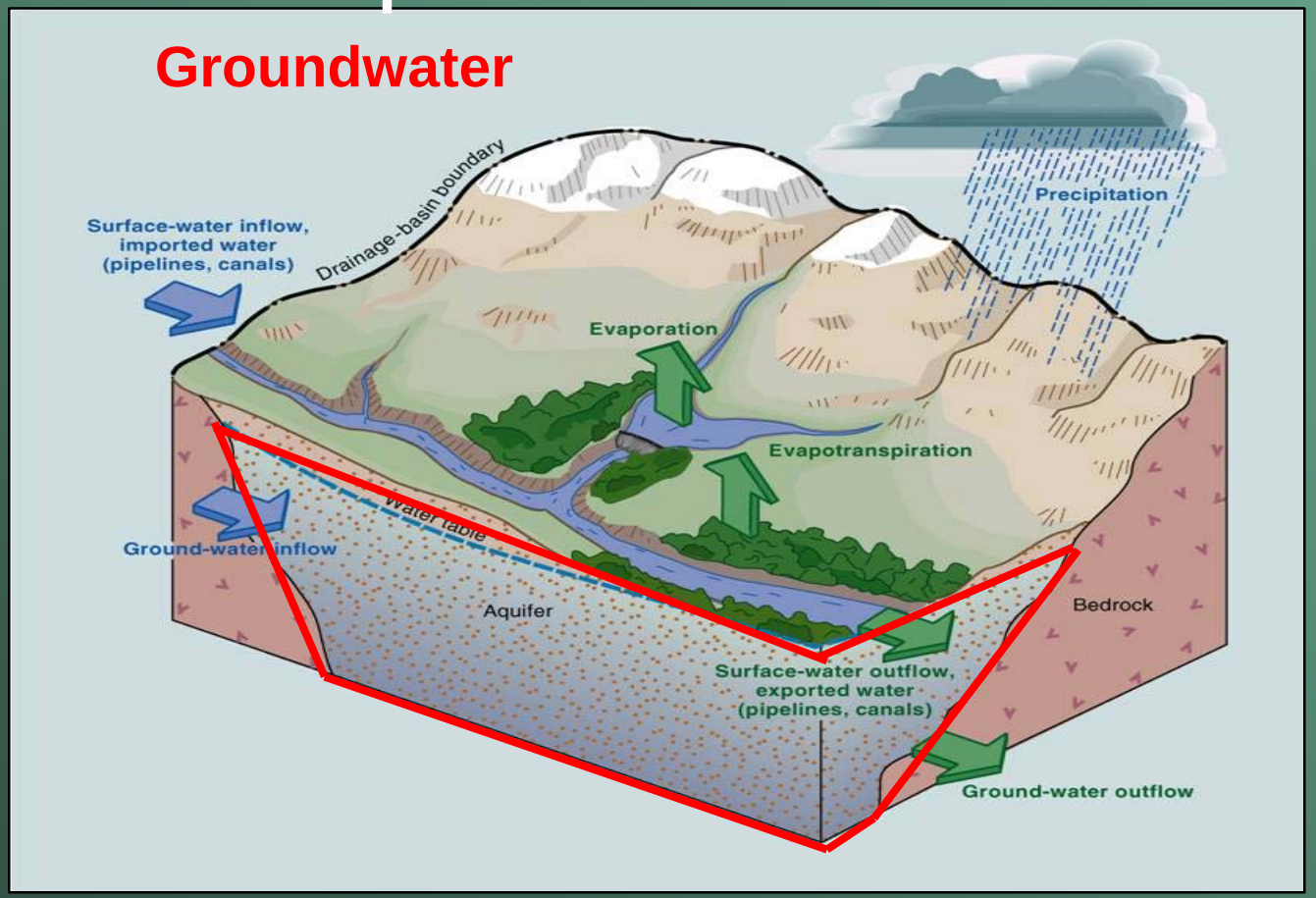
Central Indiana IFA Pilot Project



Existing USGS streamgages: 60

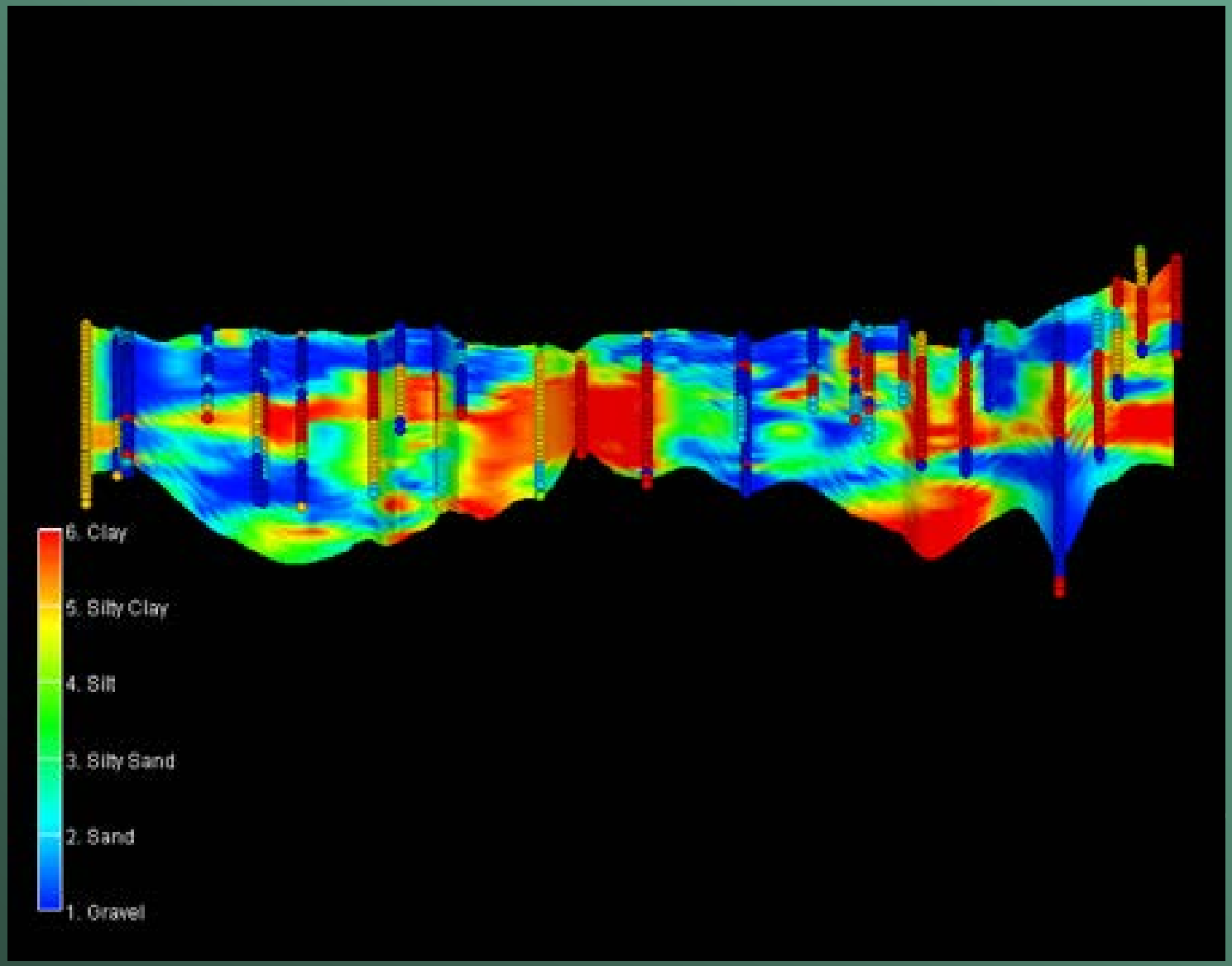
How do we know the depth and extent of an aquifer?

Groundwater level and physical characteristics data will tell us the water levels of the aquifer but how do we know the extent of the aquifer?



USGS

Aquifers are not homogenous



USGS

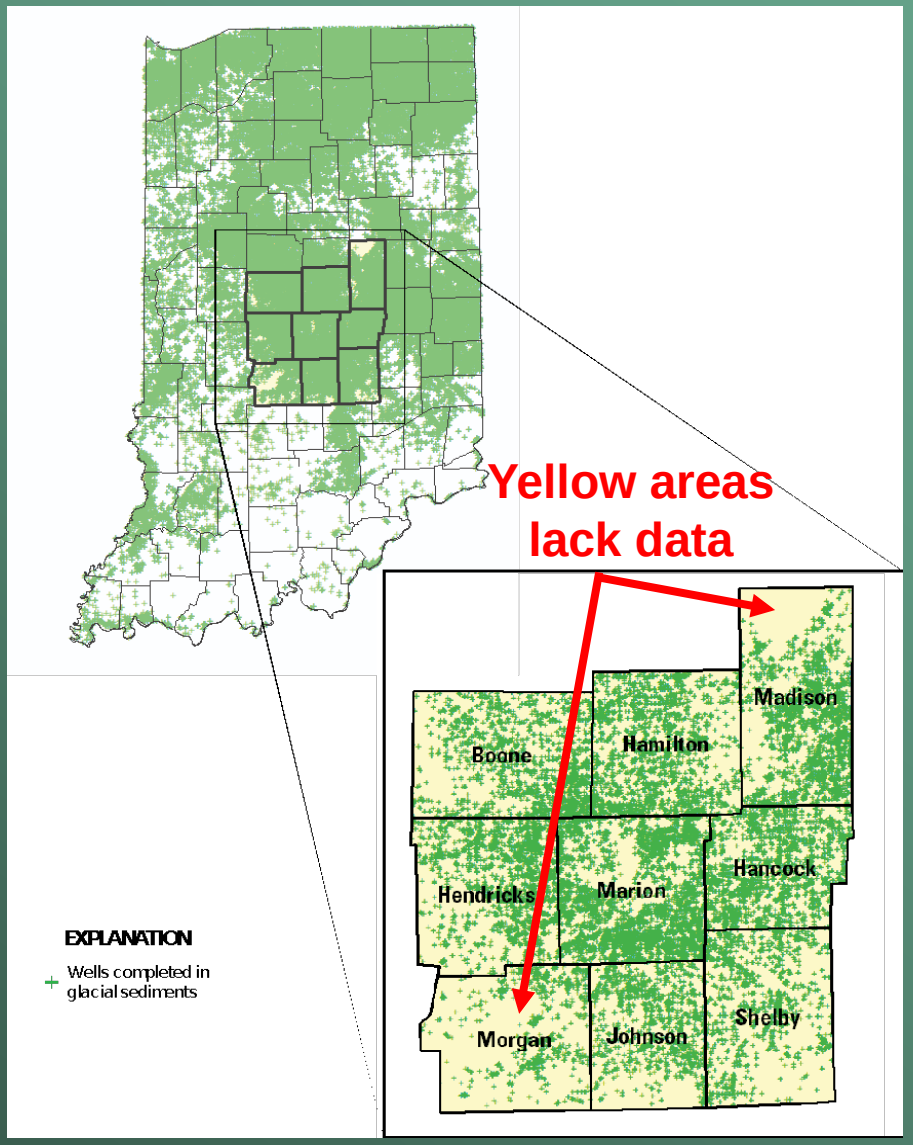
There are several ways to estimate aquifer capacity

- **Existing Data:**
  - IDNR well log data base
  - Previously published studies of groundwater systems
  - Previous mapping studies
- **Collect New Data:**
  - Drill new wells in areas lacking data
  - Use noninvasive geophysical techniques to penetrate subsurface and determine material properties
  - Use statistics to estimate aquifer properties based on existing datasets

USGS

There are several ways to estimate aquifer capacity *(cont.)*

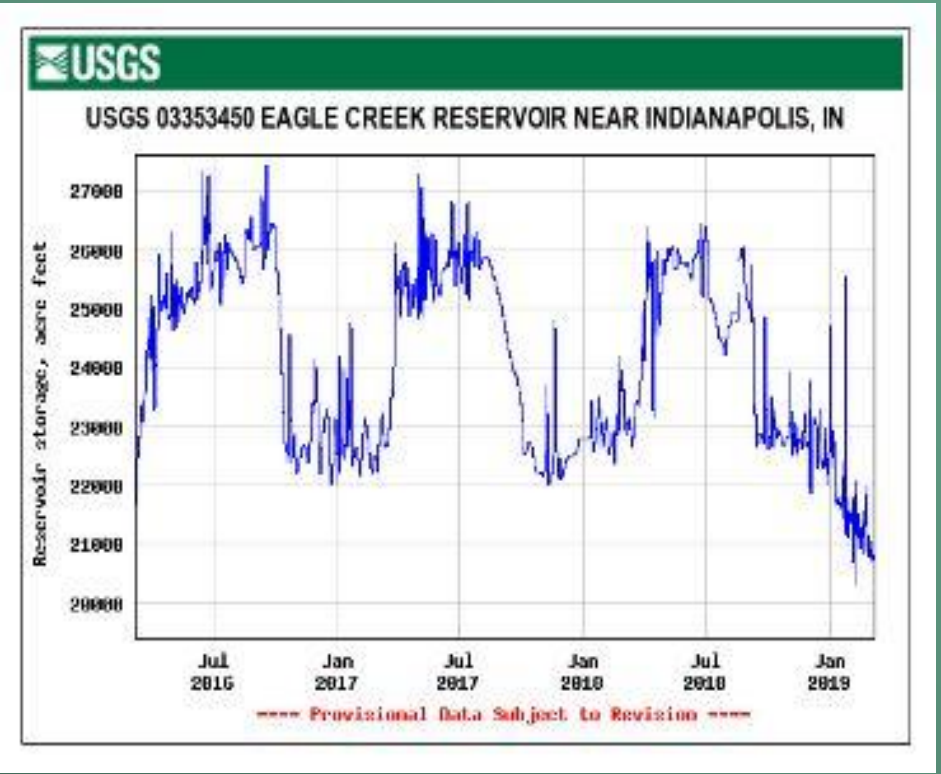
- **Well drillers logs dataset**
  - Penetrates the entire thickness of the unconsolidated deposits
  - Identifies depth of the aquifer
  - Well drillers log dataset needs updating
  - Critical for the modeling component



USGS

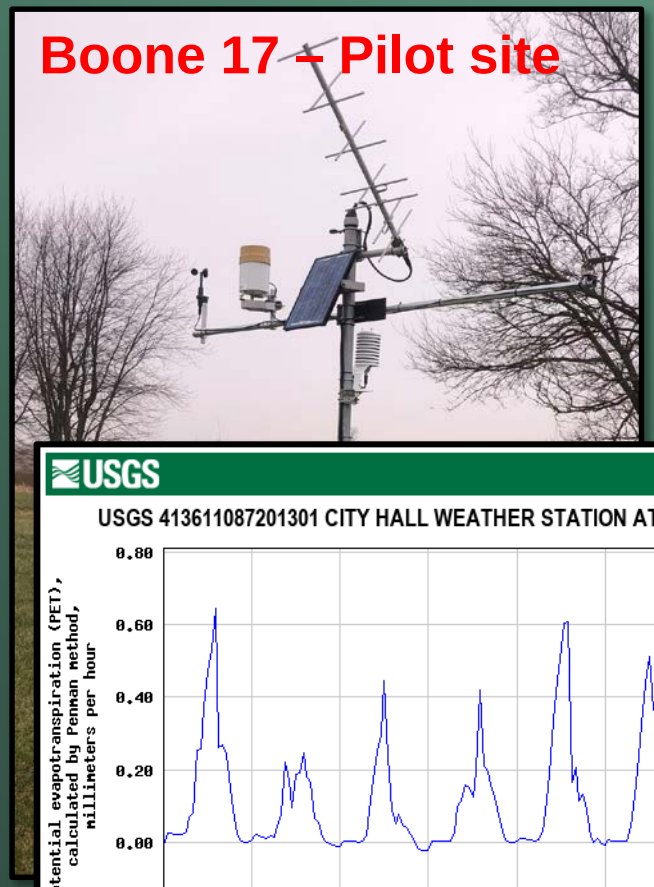
Combining reservoir water levels and storage capacity information allows for the estimation of available water

Eagle Creek, Morse and Geist Reservoirs are key to monitoring and modeling efforts.



USGS

How do we know when our Indiana water supply is under pressure: Drought Warning Sites



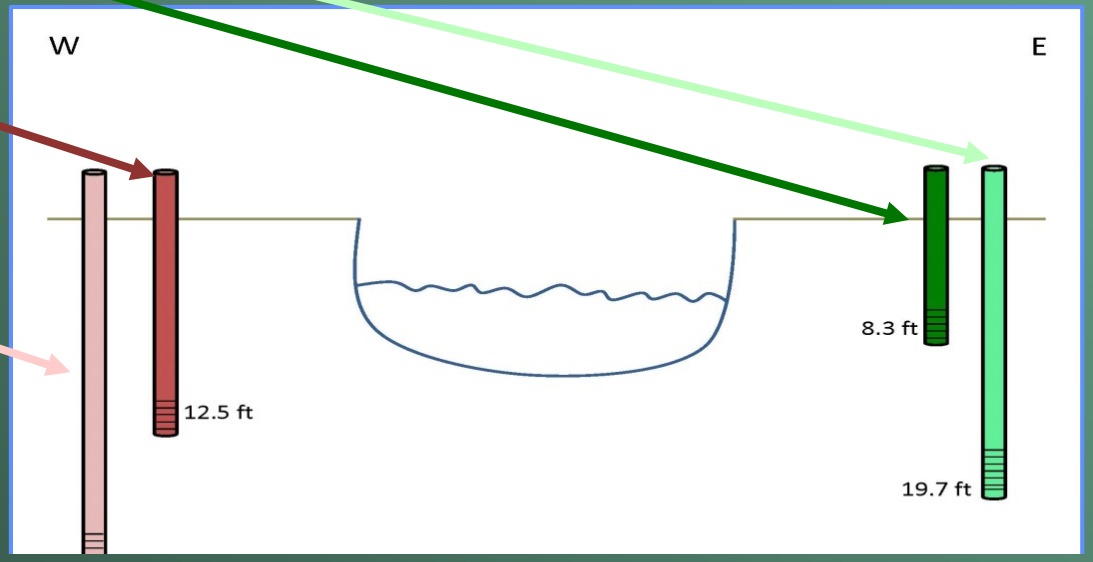
- Useful for drought forecasting, predicting water demands, irrigation timing
- Includes Real-Time:
  - Air Temperature and humidity
  - Wind speed
  - Rainfall
  - Soil Moisture
  - Parameters to calculate Potential Evapotranspiration
  - Groundwater Level

USGS

https://waterdata.usgs.gov/in/nwis/uv?site_no=400532086183901

Bringing together groundwater and surface water: GW/SW Interaction Sites

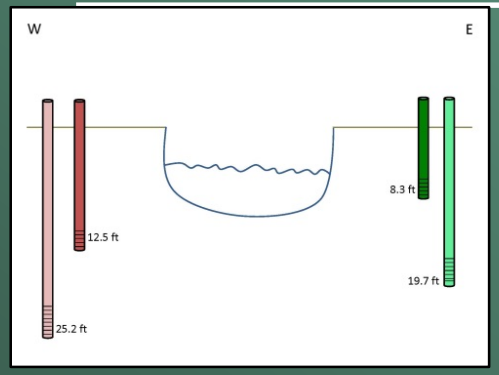
- Useful for understanding recharge/discharge conditions

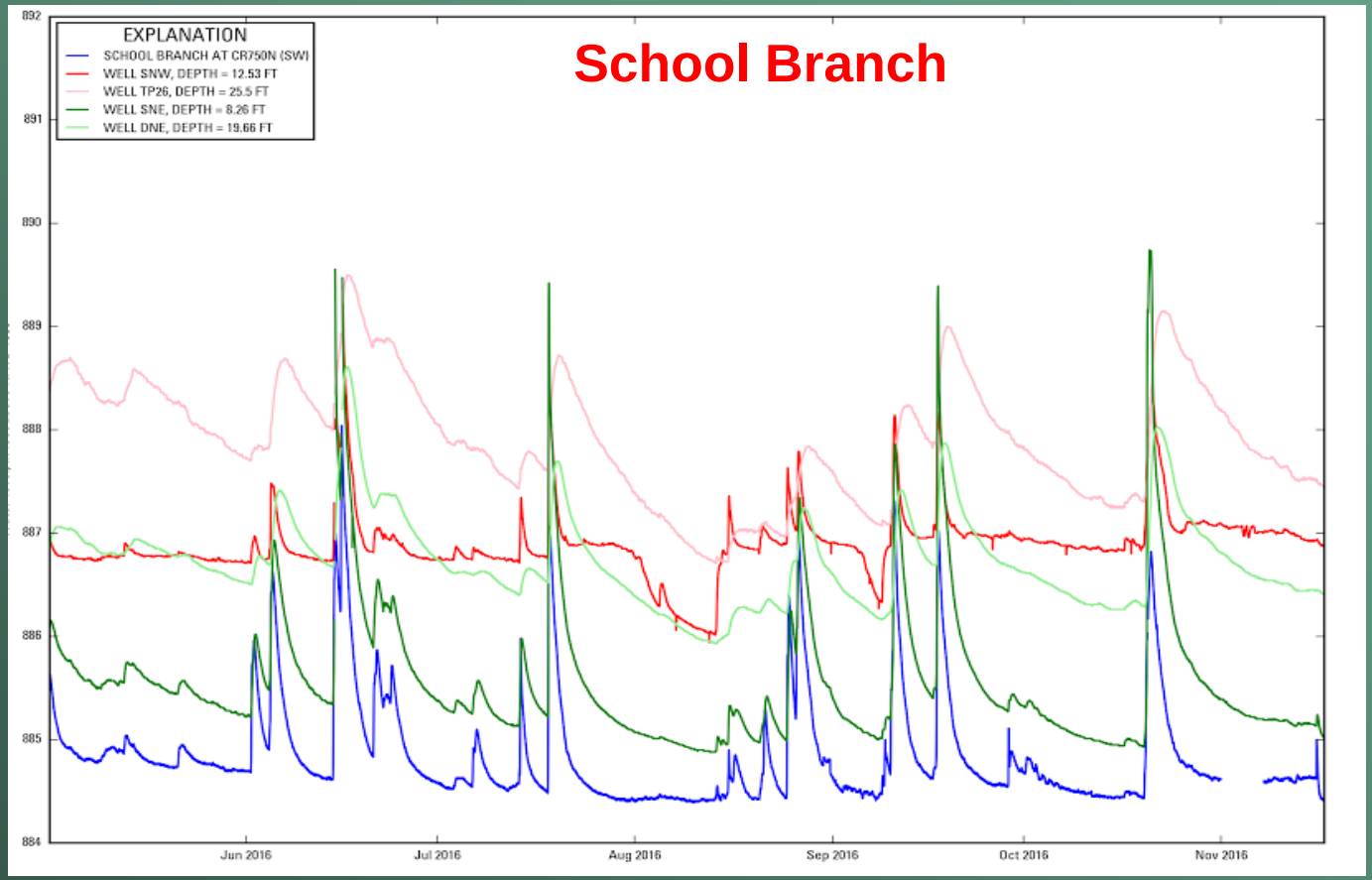


School Branch

USGS

Bringing together groundwater and surface water: GW/SW Interaction Sites





USGS

USGS data Sept. 2015 thru Nov. 2016
(some data are provisional)

Plans for improving the Groundwater monitoring in Indiana

- **Augment the existing well networks**
  - ***Increase the number of real-time wells***
  - ***Add wells in needed unmonitored areas***
  - ***Add wells that don't reflect production in key areas***
- **Create a web-based "Dashboard"**
  - ***Track water levels in key areas***
  - ***Drought Indices***
- **Identify all the key data needed for modeling**
  - **Use the pilot studies to help refine these needs**

USGS

Thank you!

David Lampe

- Indianapolis, IN
- (317) 600-2742
- dclampe@usgs.gov

Recommendations for Increased Monitoring of Indiana's Water Resource

- **"Evaluate the adequacy of existing monitoring"**
  - ***– Water Utility Resource Report; Indiana Utility Regulatory Commission (2013)***
- **"Create a robust system for monitoring water resources"**
  - ***– Modernizing the State's Approach to a Critical Resource; Indiana Chamber (2014)***
- **"Utilities believe that the state should invest in water resource data collection and analysis"**
  - ***– Evaluation of Water Utility Planning in Indiana; Indiana Finance Authority (2015)***

USGS

Central Indiana Water Study

Indiana Finance Authority (IFA)
April 29, 2019

Regional Water Studies: where and how to continue?

- Which part of the state?
  - Existing group of engaged utilities considering supply & demand issues
- What study area boundaries to use?
  - Central Indiana Drinking Water Collaborative
- What to study?
  - Central Indiana Drinking Water Collaborative
  - IDNR
  - IDEM
  - USGS

IFA Environmental Programs
Brownfields SRF

2019 Central Indiana Water Study

- Phase I – Regional Water Demand
- Phase II – Regional Water Supply
- Phase III – Water Availability Modeling and Optimization
- Phase IV – Infrastructure and Cost Analysis
- Phase V – Public Education and Outreach

Phase I – Regional Water Demand

- Tasks:
  - Determine baseline use
  - Consider all sectors: residential, commercial, industrial, and agricultural
  - Forecast water demand in the study area out to the year 2070
  - Evaluate multiple overlapping growth and drought scenarios
    - Standard summer
    - Drought of Record
    - Future climate change scenarios
    - Water conservation
    - Lawn irrigation
- RFP on hold

Phase II – Regional Water Supply

- USGS
- Tasks:
  - Identify and collect data necessary to have a better understanding of groundwater and surface water supplies in central Indiana, including aquifer levels and stream flows
  - Install/update monitoring wells
  - Install stream gauges
  - Upgrade weather stations
  - Other analyzes

Phase III – Water Availability Modeling and Optimization

- Responses to RFP under review by IFA
- Tasks:
  - Construct a regional water model
  - Determine total water availability in the study area
  - Define areas of aquifer stress and potential limitations and/or surpluses under various operational and climate scenarios
  - Collect localized data needed to understand the effects of utility water withdrawal operations on groundwater and surface water systems
  - Tool that will allow utilities to add wells and change pumping rates for predictive purposes

IFA Environmental Programs
Brownfields SRF

Phase IV – Infrastructure and Cost Analysis

- RFP on IFA website (https://www.in.gov/ifa/3006.htm) *due today!*
- Tasks:
  - Evaluate potential infrastructure needed to address deficits forecasted in Phase III, including a cost benefit analysis, environmental siting, regulatory, and permitting conditions
  - Evaluate potential interconnections, and the technical, regulatory and operational issues that would need to be addressed

Phase V – Public Education and Outreach

- RFP on IFA website (https://www.in.gov/ifa/3006.htm)
- Tasks:
  - Identity topics that would aid the utilities in the study area to better communicate water supply and demand issues with the residents of Central Indiana
  - Work with utilities in the study area to develop a regional public education message regarding the water supply and demand issues
  - Develop needed public education materials
  - Develop outreach implementation plans that include timelines and estimated costs

IFA Environmental Programs
Brownfields SRF

Central Indiana Water Study Timeline

		CY 2019				CY 2020			
Phase	Topic	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Phase I	Regional Demand								
Phase II	Regional Supply								
Phase III	Water Availability Modeling and Optimization								
Phase IV	Infrastructure and Cost Analysis								
Phase V	Public Education and Outreach								

Central Indiana Water Study Advisory Committee

- IDNR
- IDEM
- Central Indiana Drinking Water Collaborative
- Indiana ACEC (American Council of Engineering Companies)
- Indiana University

IFA Environmental Programs
Brownfields SRF

Central Indiana Water Study: next steps

- Engage USGS/consultants and begin work – starting in May/June/July
- Post updates on website
  - Today's agenda and presentations
- Give updates at the Central Indiana Drinking Water Collaborative's meetings
- Conduct additional public meetings – starting this fall/winter

Questions? IFA website (https://www.in.gov/ifa/3006.htm)

Sarah Hudson, IFA Water Resources and Infrastructure Planning Program

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Daniel Lundberg, IFA Water Resources and Infrastructure Planning Program (RFP responses)

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Joanie Jones, IFA Environmental Programs

(Central Indiana Water Study email list for updates)

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