

It Takes a Village to Build a National Map of Water Utility Service Area Boundaries - the Benefits of Commissions and Consumer Advocates Being Part of the Village

National Association of State Utility Consumer Advocates

2023 Mid-Year Meeting
Monday, July 16, 2023



Yolanda J. McDonald, Ph.D. on behalf of the Vanderbilt University Drinking Water Justice Lab 2022-2023 Digitization Team (Marie A. Caiola (Lead RA), Sammy Wyman (Lead RA), Ellie Crone, Shirley Wu), & Natalie Robbins

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DWJL

Drinking Water Justice Lab

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Overview

- **Vanderbilt University (VU) Drinking Water Justice Lab**
- **Community-Based Participatory Research Approach**
- **CWSs ESAB Research Project: Tennessee & Nationwide Effort**

Overview VU Drinking Water Justice Lab (DWJL)

DWJL Mission

To facilitate community engagement to create ongoing awareness and understanding of drinking water justice issues (i.e., access, affordability, and quality). To provide an immersive, interdisciplinary training experience for students.

DWJL Purpose

Drinking water research is critical because access to water ensures human life, but also, because water enables one to maintain dignity. A life [without water](#) means one must experience financial and time hardships associated with procuring water to bathe, cook, flush a toilet, clean with, and drink.

Our purpose aligns with NASUCA's to "achieve safe, reliable, and reasonably priced utility services" for all.

Community-based Participatory Approach: The Research Team

Tennessee Association
of Utility Districts

Vital for Tennessee's future



TN

Department of
Health

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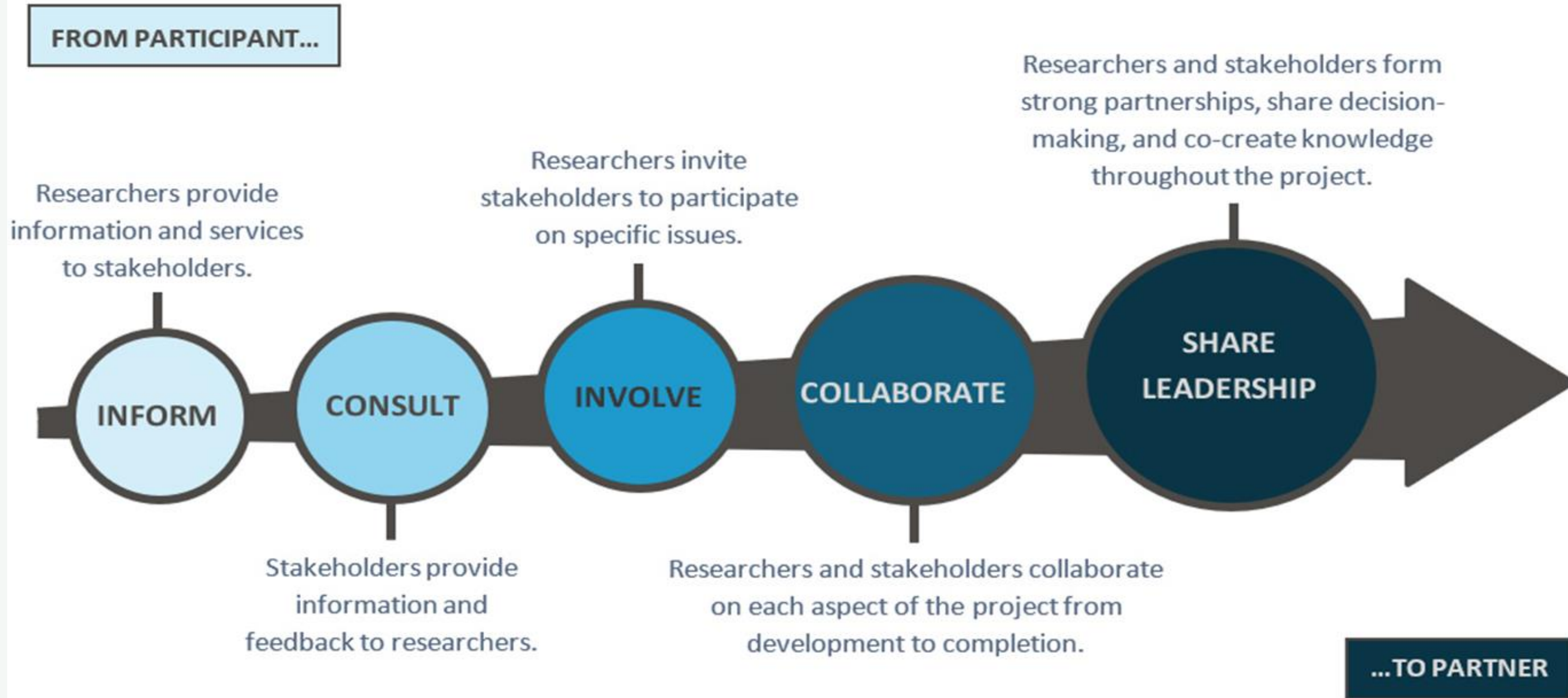
Drinking Water Justice Lab

TN

Department of
**Environment &
Conservation**

Community-Based Participatory Research Approach

Exhibit 1. Continuum of stakeholder participation



Adapted from:

Balazs, C. L., & Morello-Frosch, R. (2013). The three R's: How community based participatory research strengthens the rigor, relevance and reach of science. *Environmental Justice*, 6(1).

National Institutes of Health. (2011). *Principles of community engagement second edition*. (NIH Publication No. 11-7782).

Project Rationale: The Need for CWSs ESAB

Predominant unit of analyses of CWS drinking water justice research (e.g., access, affordability, and quality) discourse:

- **National:** EPA and national dialogue
- **State/Regional:** Balazs, C. L., Morello-Frosch, R., Hubbard, A. E., & Ray, I. (2012); Cory, D. C., & Rahman, T. (2009)
- **County:** Allaire, M., Wu, H., & Lall, U. (2018); McDonald and Jones (2018)
- **City:** Switzer & Teodoro (2017)

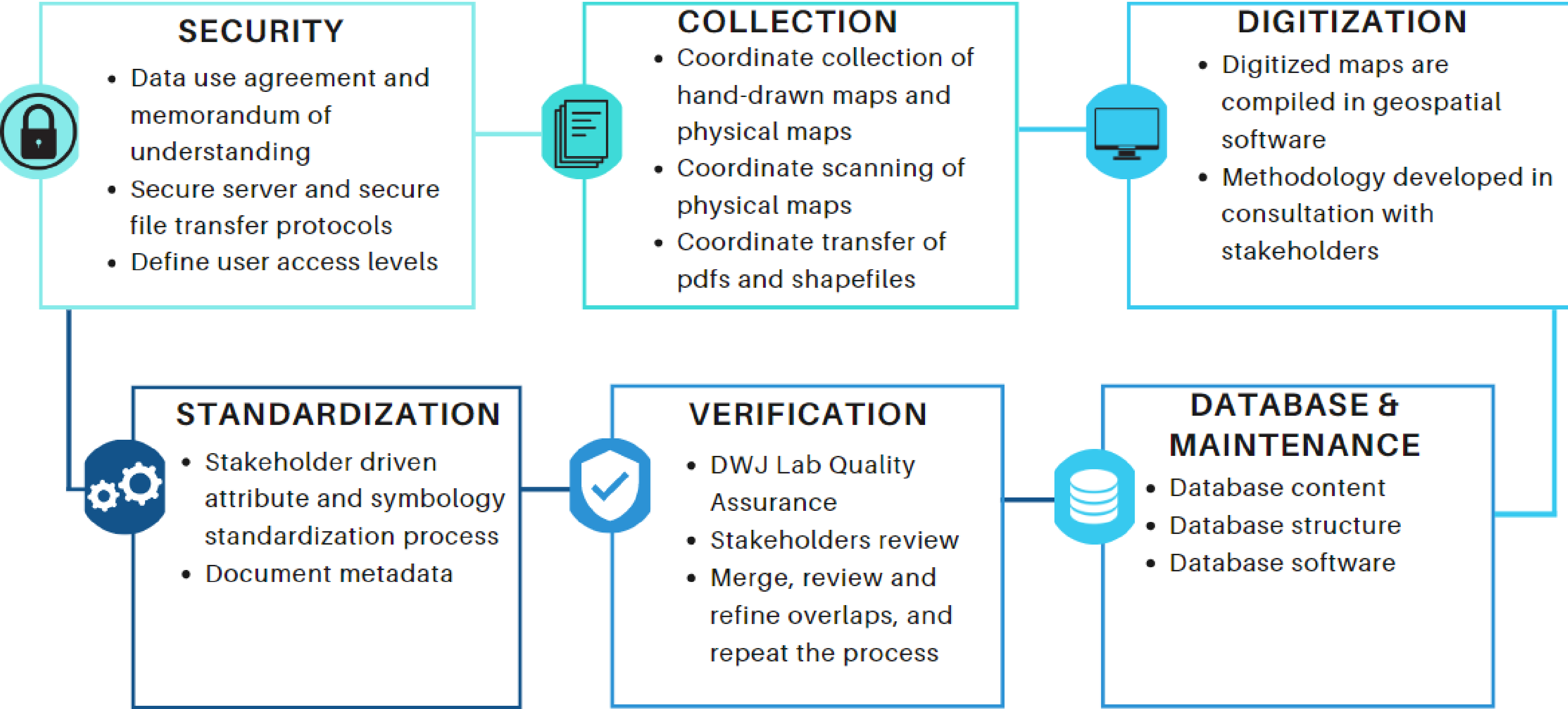
Project Rationale: Where are the CWSs?

Why it Matters: The need to refine county-level and city-level analysis

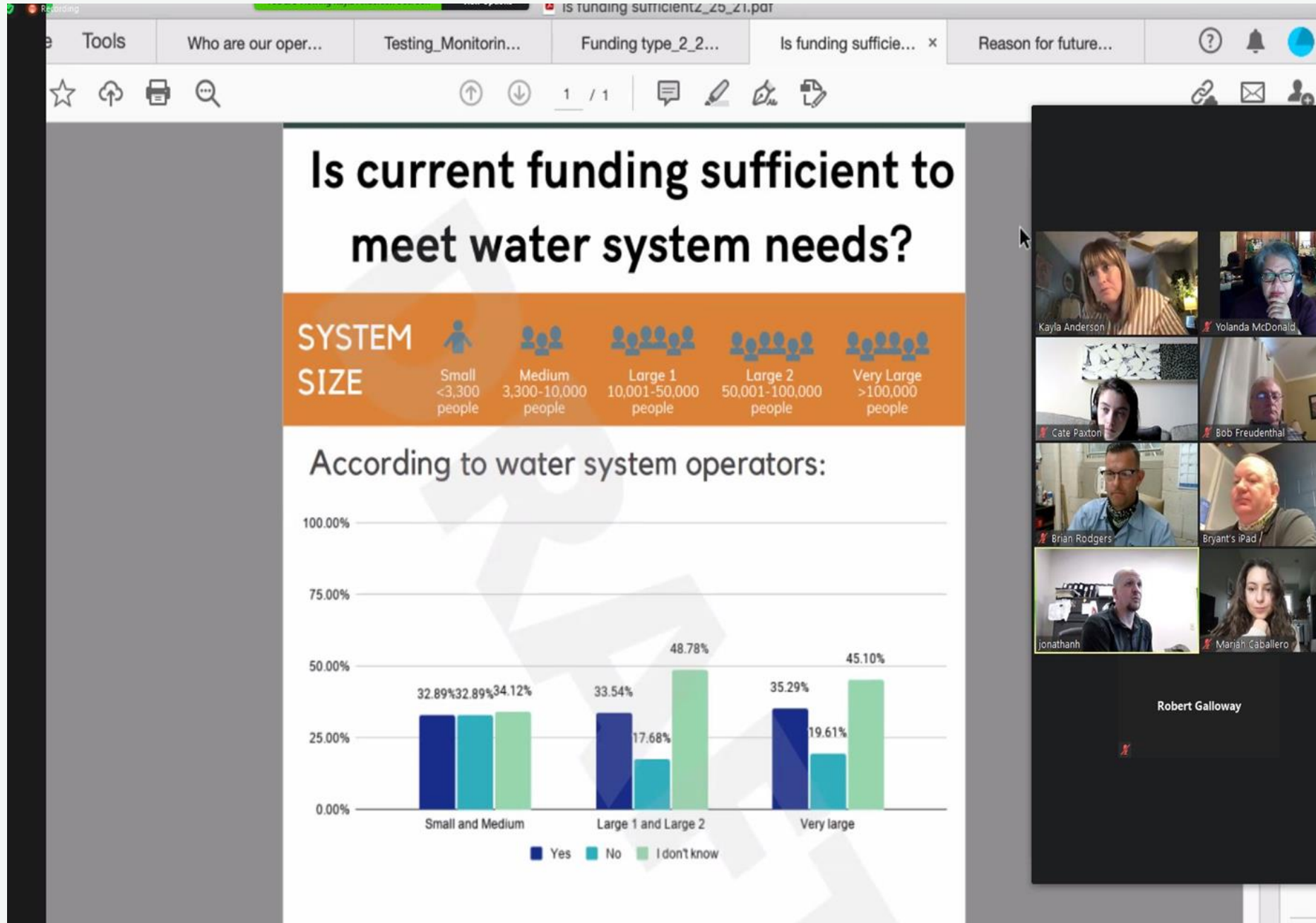
- **Potential misclassification of sociodemographic characteristics of a CWS service population**
- **Potential bias introduced through the spatial aggregation of drinking water violations; Modifiable Areal Unit Problem (MAUP)**



Creating TN CWSs ESAB database – The Process



Ongoing Communication and Collaboration: Examples of Consulting and Involving Stakeholders



Communication and Reporting: Lots of details to manage TN CWSs ESABs project

Environmental Field Offices
tn.gov/environment/topic/about-field-offices

Have a Question about Tennessee's Environment? Call 1-888-891-TDEC (8332) ask.tdec@tn.gov tn.gov/environment/topic/about-field-offices

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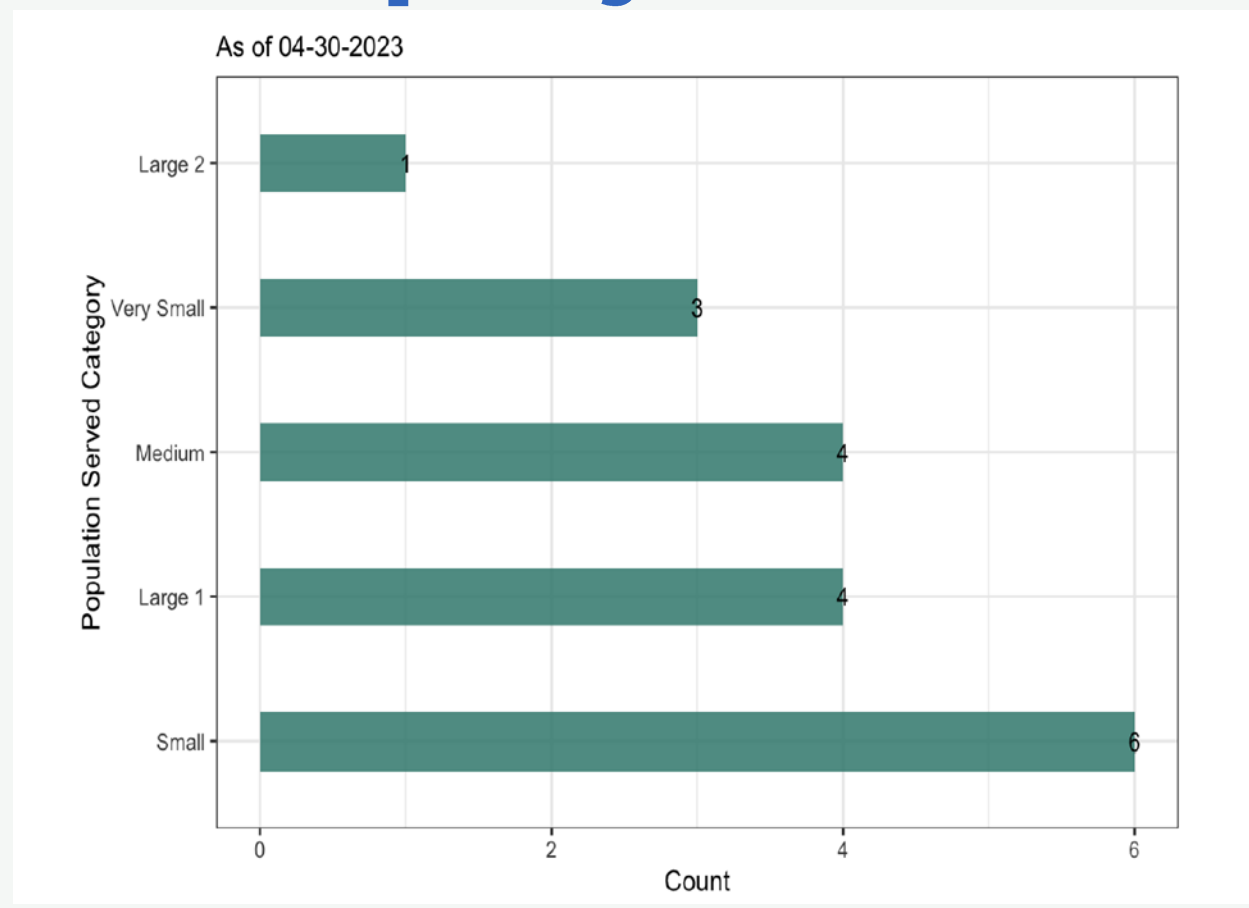
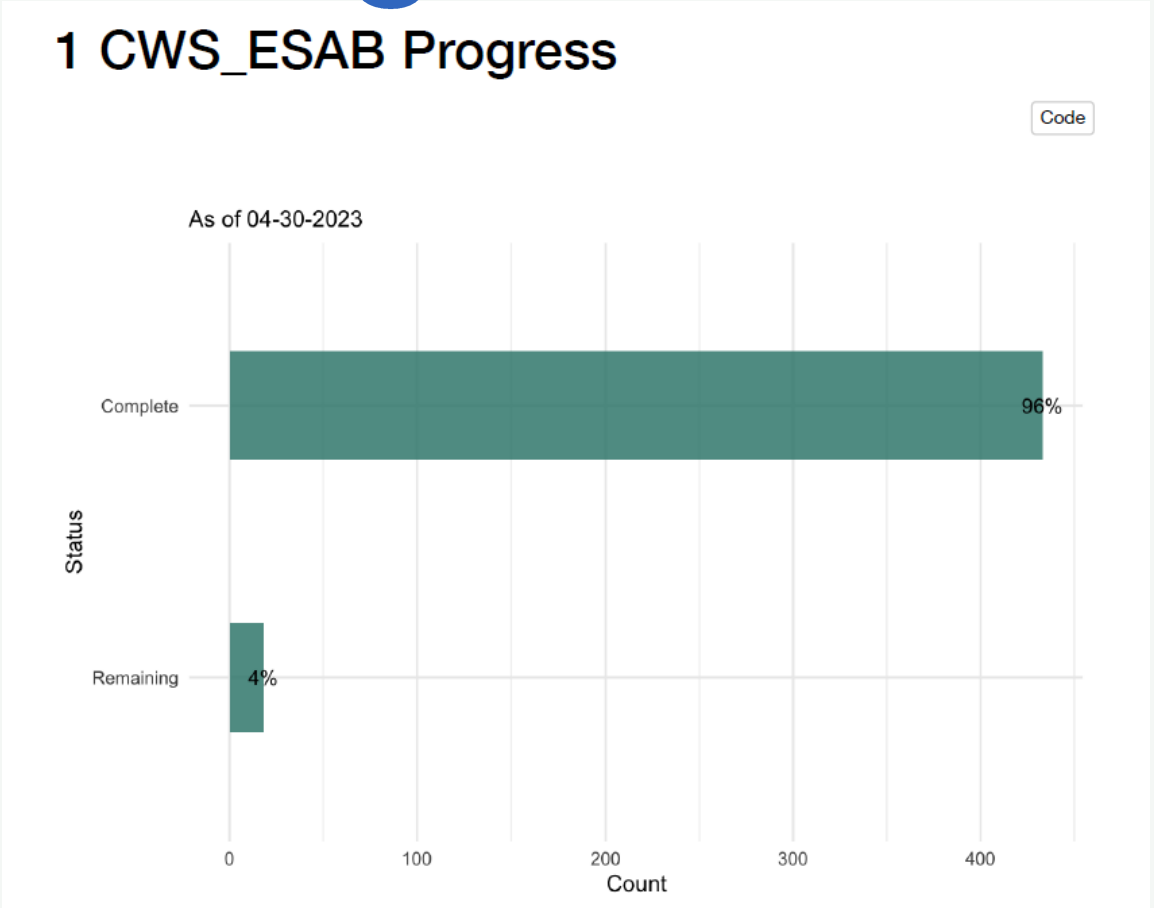
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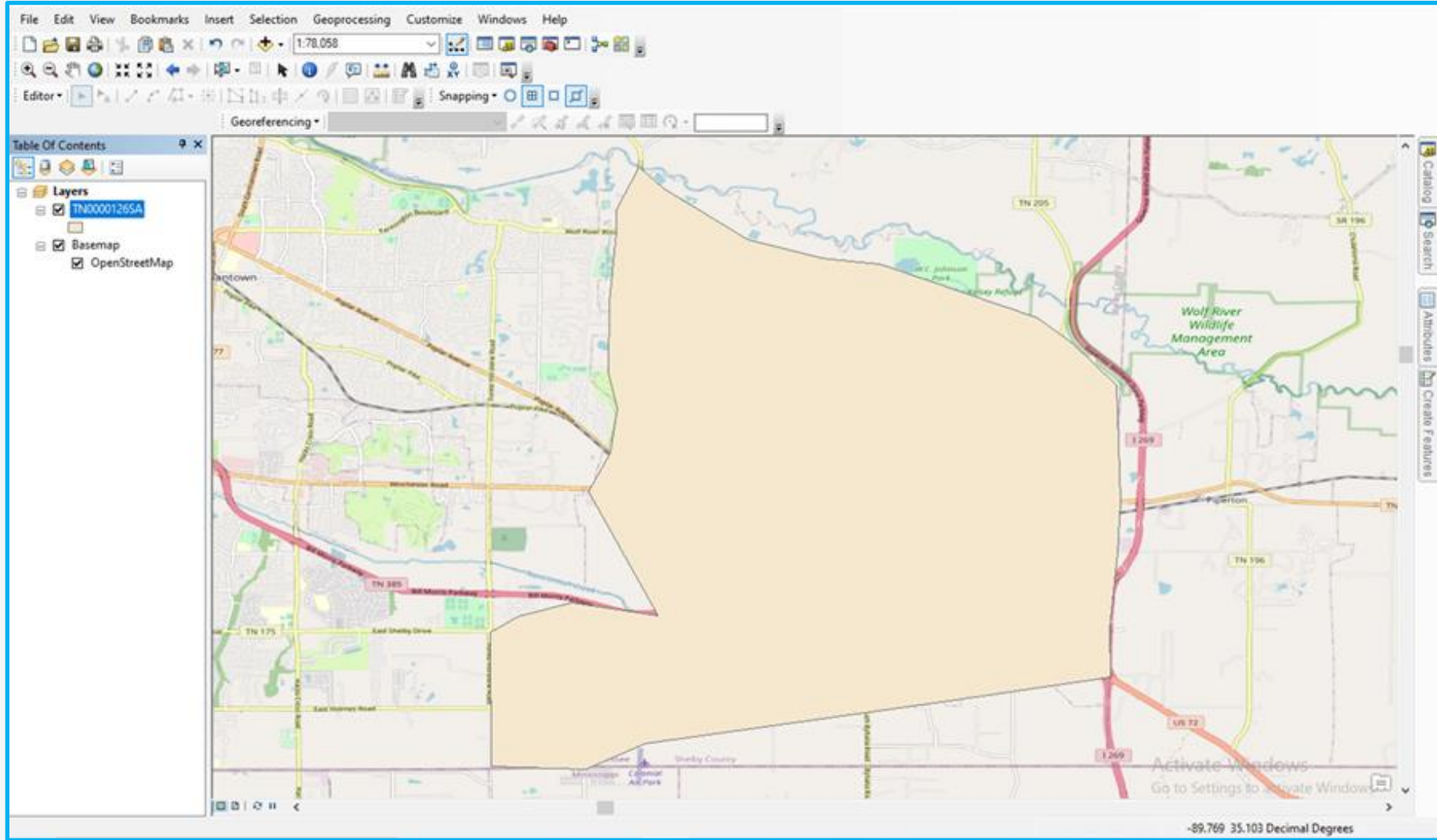
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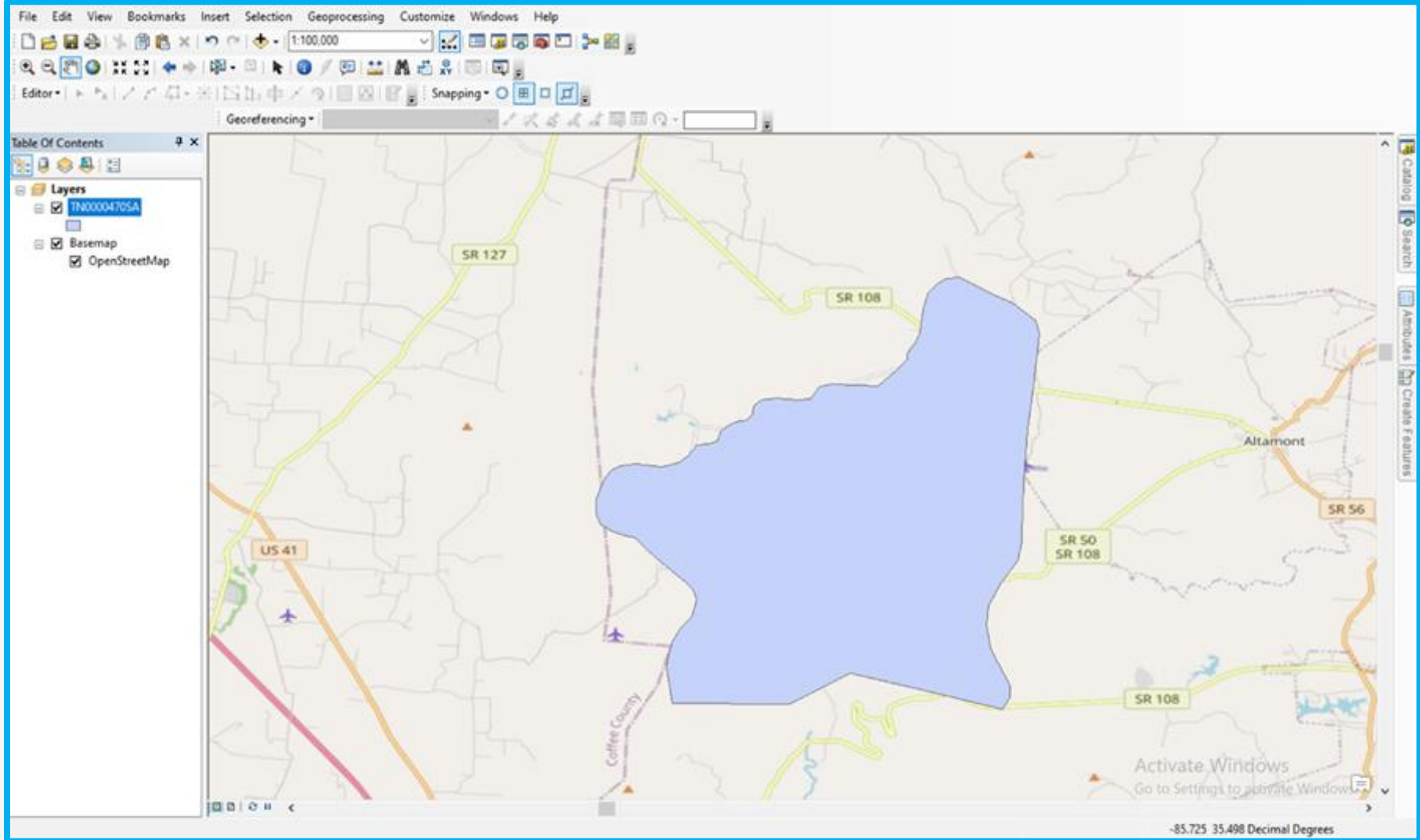


pwsid	PWS_Name	FieldOffice	County_served	Cnty_stat	act_stat	Pop_Cat_5	pop_serv	Georeferenced	ESAB
TN0000001	WEST ROBERTSON WATER AUTHORITY	Nashville	Robertson		Active	3,301-10,000	5422	Yes	yes
TN0000002	ADAMSVILLE WATER SYSTEM	Jackson	McNairy	At-Risk	Active	3,301-10,000	9091	Yes	yes
TN0000005	ALAMO WATER DEPARTMENT	Jackson	Crockett		Active	501-3,300	3103	Yes	yes
TN0000006	COUNTY WIDE UTILITY DISTRICT	Jackson	Crockett		Active	3,301-10,000	8412	Yes	yes
TN0000007	ALCOA WATER SYSTEM	Knoxville	Blount		Active	10,001-100,000	30268	Yes	yes
TN0000008	ALEXANDRIA WATER SYSTEM	Cookeville	DeKalb		Active	501-3,300	2802	Yes	yes
TN0000009	ALGOOD WATER SYSTEM	Cookeville	Putnam		Active	3,301-10,000	8713	Yes	yes
TN0000010	ALLARDT WATER WORKS	Cookeville	Fentress	At-Risk	Active	3,301-10,000	3613	Yes	yes
TN0000013	NORTH OVERTON UTILITY DISTRICT	Cookeville	Overton		Active	3,301-10,000	4393	Yes	yes
TN0000014	ALPHA-TALBOTT UTILITY DISTRICT	Knoxville	Hamblen		Active	10,001-100,000	17934	Yes	yes
TN0000018	ARDMORE WATER SYSTEM	Columbia	Giles		Active	501-3,300	1691	Yes	yes
TN0000022	ARTHUR-SHAWANEE UTILITY DISTRICT	Knoxville	Claiborne	At-Risk	Active	10,001-100,000	10733	Yes	yes
TN0000023	ASHLAND CITY WATER DEPARTMENT	Nashville	Cheatham		Active	3,301-10,000	8030	Yes	yes
TN0000024	ATHENS UTILITIES BOARD	Chattanooga	McMinn		Active	10,001-100,000	24610	Yes	yes

TN CWSs ESAB Digitization Examples



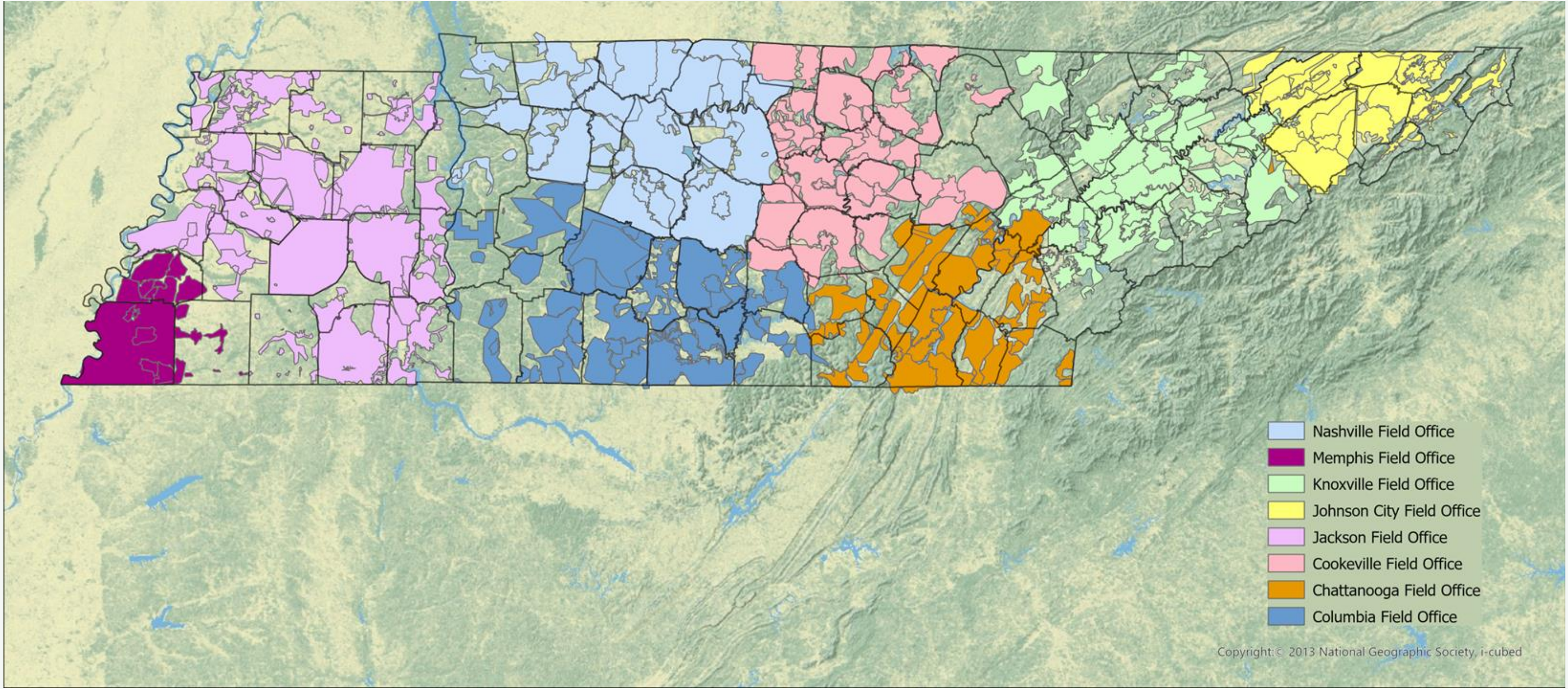
PWSID: TN0000126
CWS Name: Collierville Water Dept.
Field Office: Memphis
County Served: Shelby
Population Served: 47,580



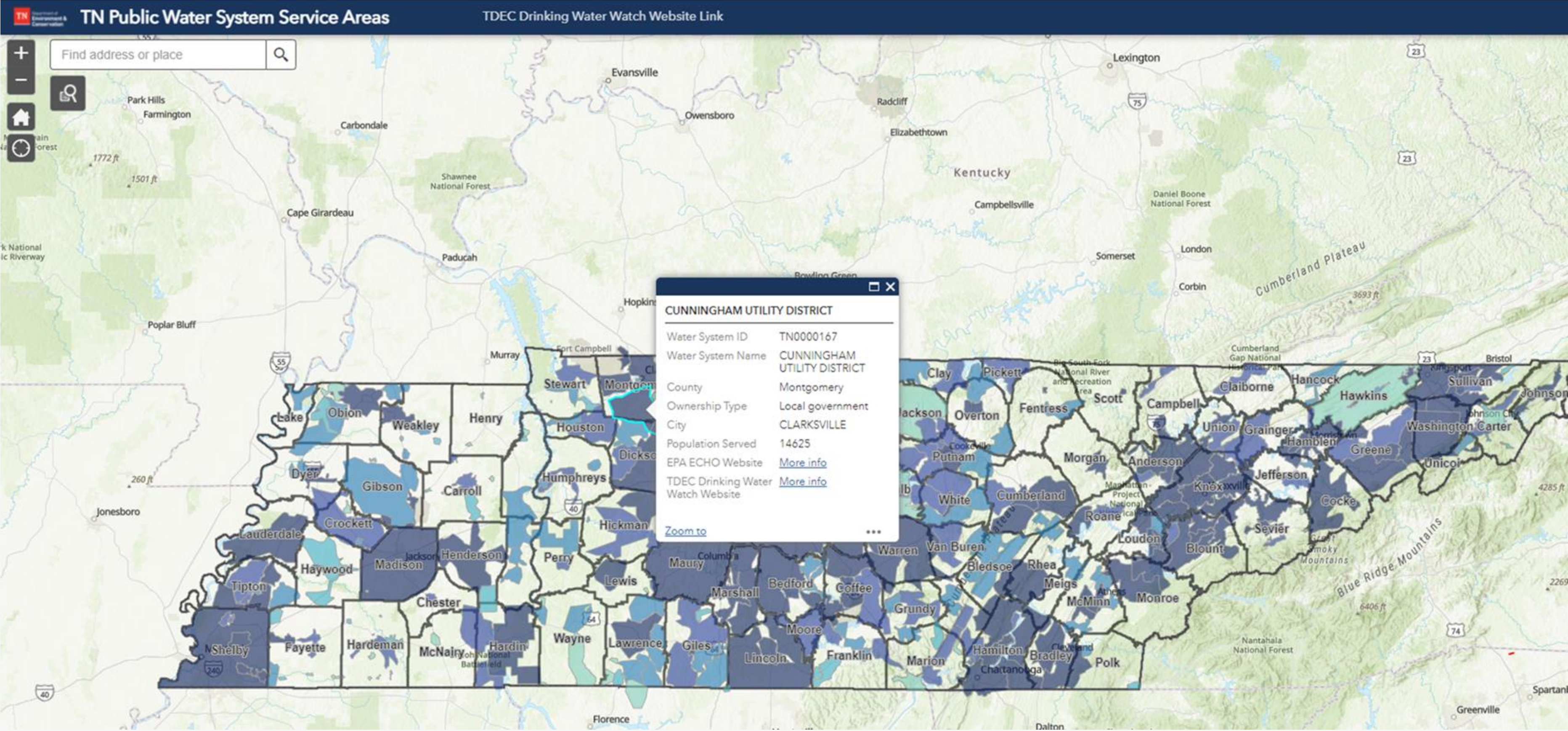
PWSID: TN0000470
CWS Name: Monteagle Public Utility
Field Office: Chattanooga
County Served: Grundy
Population Served: 3,459

Current Status of TN CWSs ESAB Project: 98%

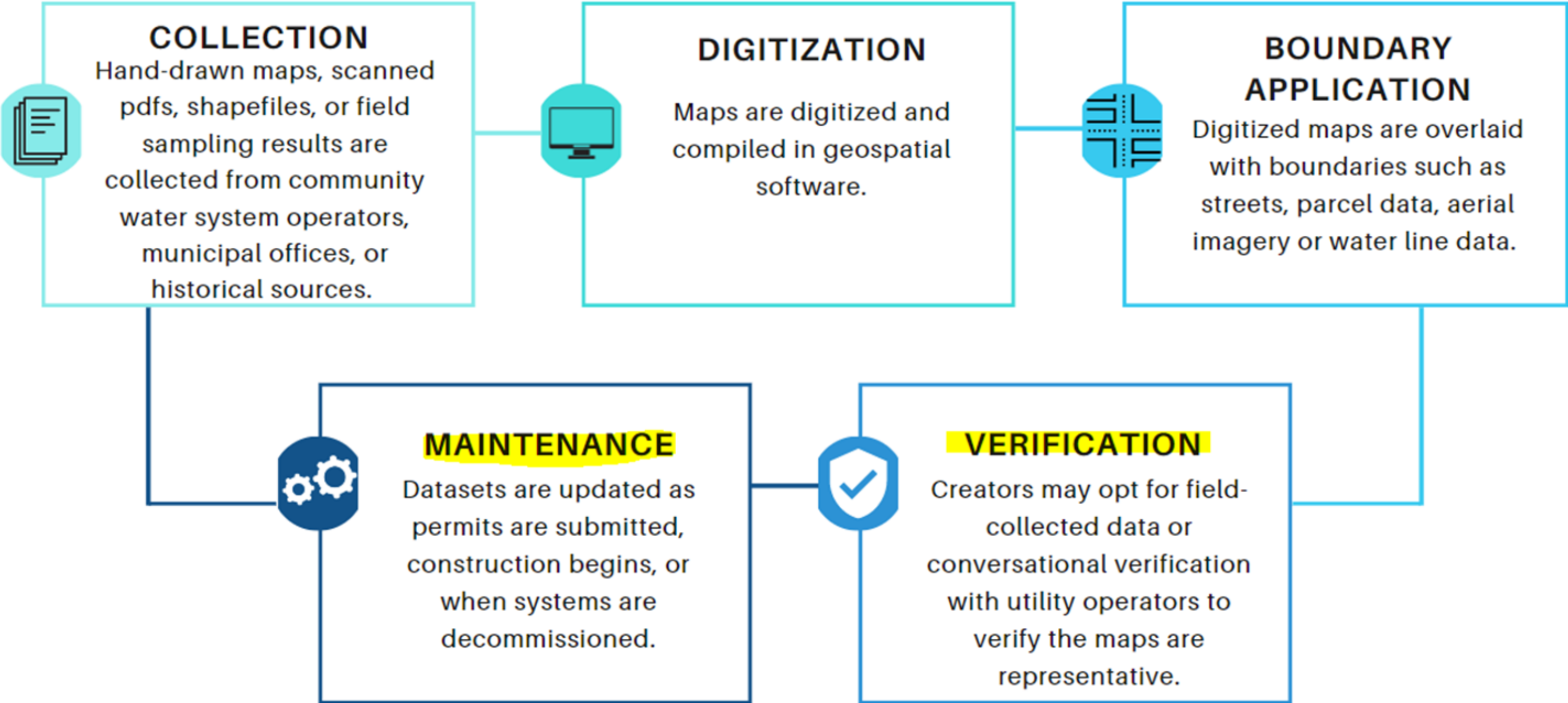
443 out of 451 systems, 8 remaining










TN CWSs ESAB Public Visualization: Prototype

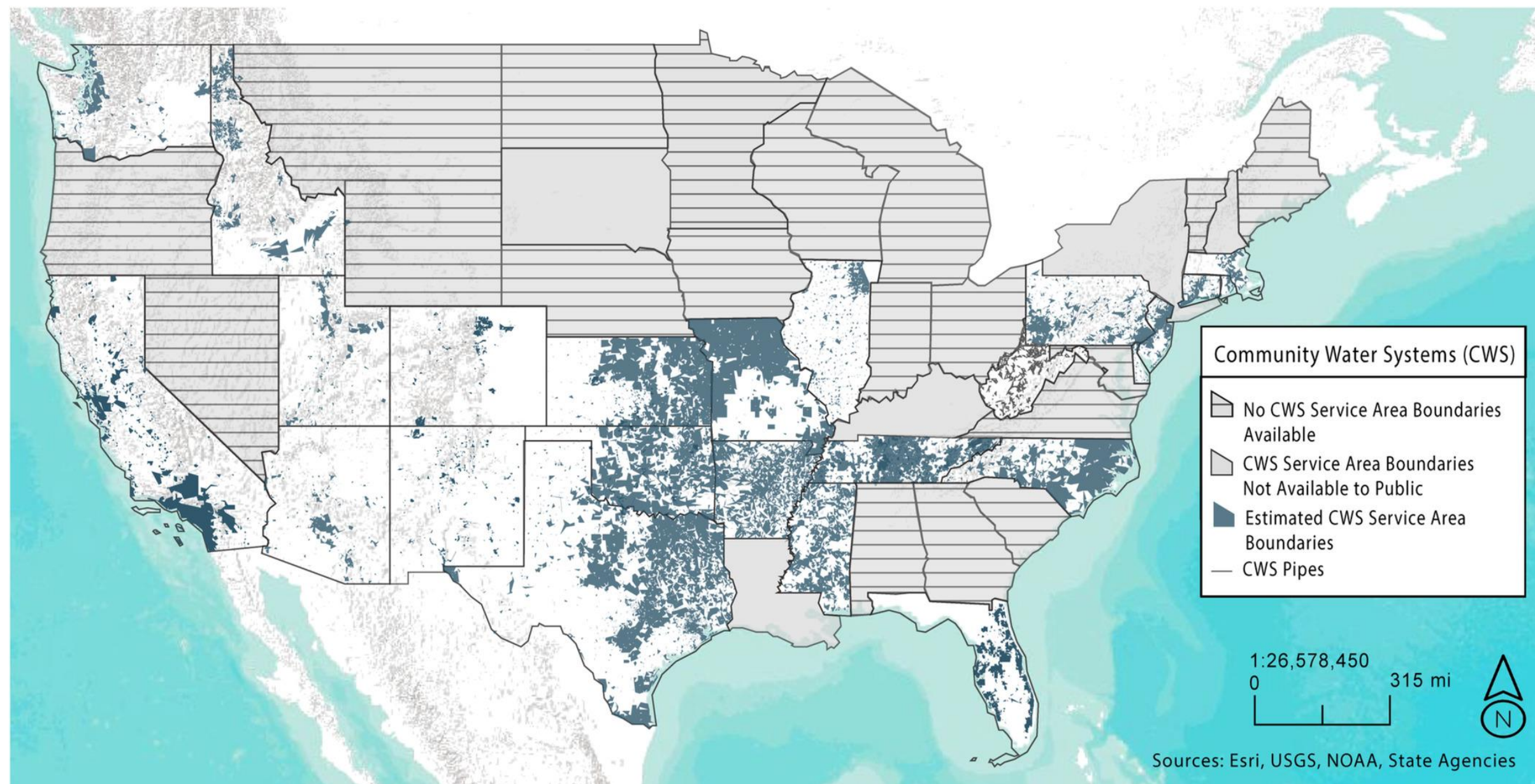


The Village Approach Needed: Future of CWSs



A systematic review of geospatial representation of United States community water systems

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Ke Jack Ding¹  | Douglas H. Fisher¹  | Caroline P. Morkel²  | Elaine L. Hill³ 



2021 Status: 24 states & DC had polygons

2023 Update: 29 states & DC have polygons; at least will add one more state

Acknowledgements: TN CWSs ESAB

A special thank you to the CWSs that have shared their maps with the DWJL

- **TDH:** **Judy Manners** and Mary-Margaret Fill
- **TAUD:** **Greg Baker**, Bob Fruedenthal, & David Money
- **TDEC:** **Jenny Dodd, David Money, Brian Ham**, Seth McCormick, Jeff Bagwell, & Richard Rogers
- **DWJL Digitization Team (not possible without these dedicated RAs):**
 - **2018 – 2019** Dmitry Semenov (Lead RA), Adrienne Parks, & Rachel Flores
 - **2019 – 2020** Dmitry Semenov (Lead RA), Aakash Manapat, & Ashley Kim
 - **2020 – 2021** Ashley Kim (Lead RA), Aakash Manapat, Austin Fernandez, & Marie A. Caiola
 - **2021 – 2022** Ashley Kim (Lead RA), Marie A. Caiola (Lead RA), Meena Muthusubramanian, Austin Fernandez, Minoli Fernando, & Natalie Robbins
 - **2022 – 2023** Marie A. Caiola (Lead RA), Sammy Wyman (Lead RA), Ellie Crone, Shirley Wu, & Natalie Robbins
 - Ongoing DWJL Support: Kayla M. Anderson & Mariah D. Caballero

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Tennessee Department of Health (TDH), National Center for Environmental Health, Centers for Disease Control (prime), CDC-RFA-EH20-2025.

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**Interdisciplinary
DiscoveryGrants**

Thank you! And a note from VU DWJL Member

"Since joining the DWJL Digitization Team this past fall, I have learned so much about the importance of GIS in informing drinking water policy as well as the immense state-wide collaboration that this kind of community-based research requires. I am appreciative of the opportunity to contribute to such an influential project!" -
Ellie Crone, TN CWS ESAB Digitization RA

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