TCR Compliance Monitoring

Large Systems vs. Small Systems

This Meeting's Presentations

Objectives

Provisions

System compliance

Improvement

Research

Comparison of Implementation of TCR – Small vs. Large Systems

FAC Questions Addressed in Presentation

- How does the actual implementation of the TCR vary between small systems and large systems?

Public Water Systems

- 86% of the population (262 million) are served by medium and large systems

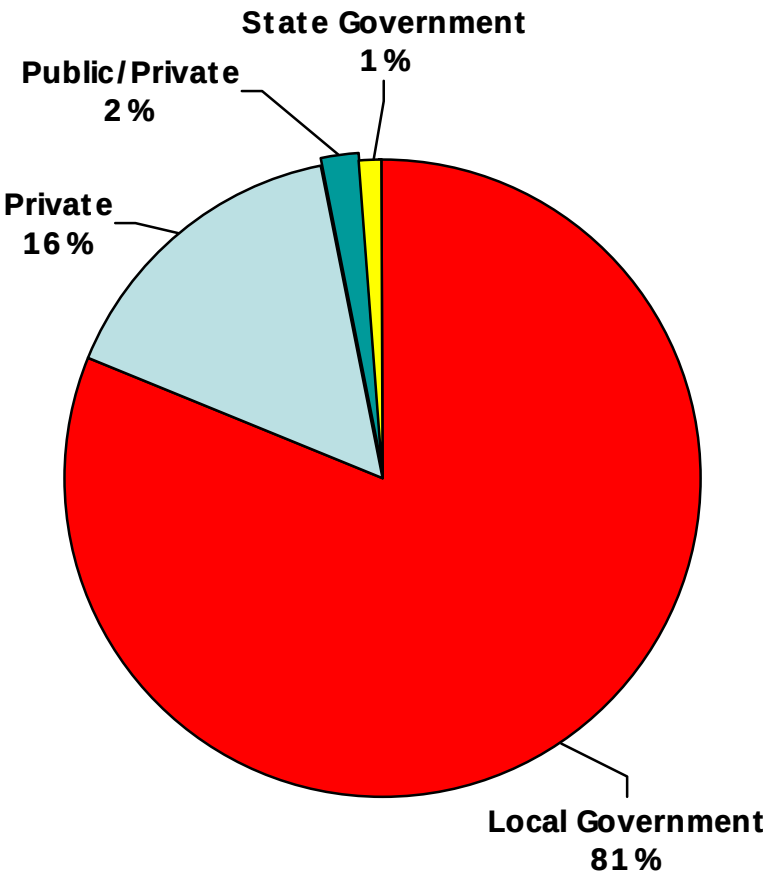
  (those serving > 3,300)

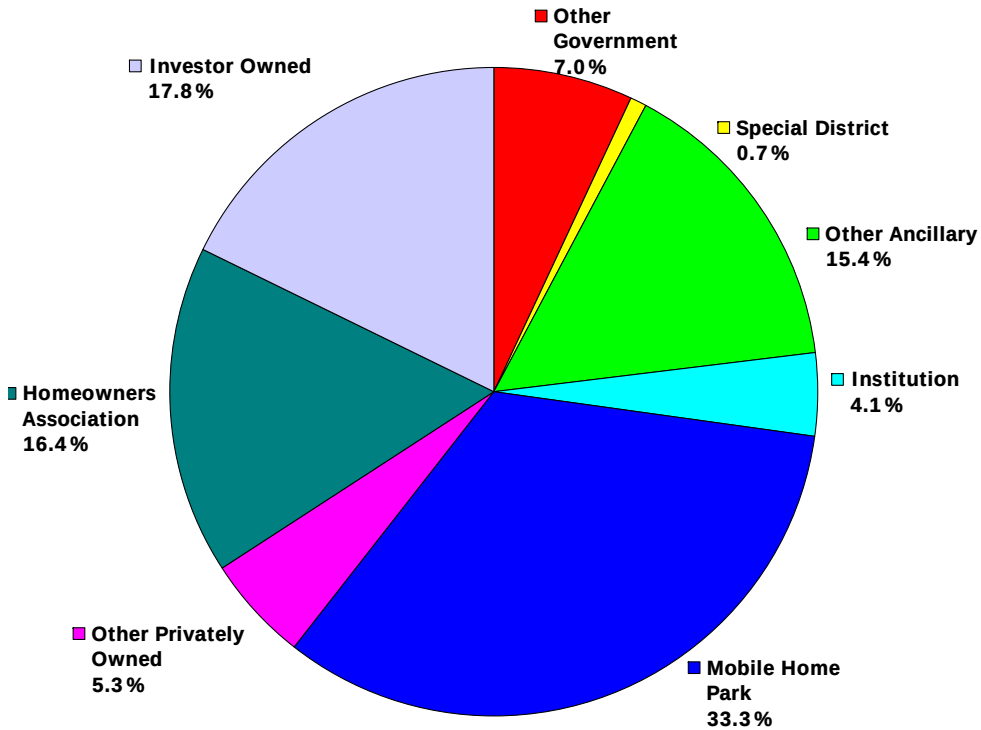
- 14% of the population (41 million) are served by Small Systems

  (those serving ≤3,300)

- 158,221 Drinking Water Systems in the United States
- 149,182 (94%) of all drinking water systems are Small
- (those serving ≤3,300)

Ownership of Systems





Largest

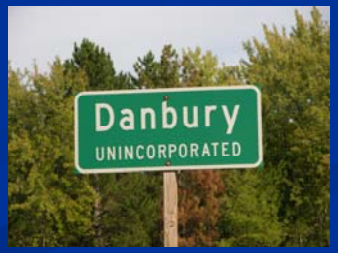
Serving > 100,000

Smallest

Serving < 100

Large Diversity of Small Systems

- 44,055 CWS
- 19,055 Non –Transient NCWS
- 86,072 Transient NCWS

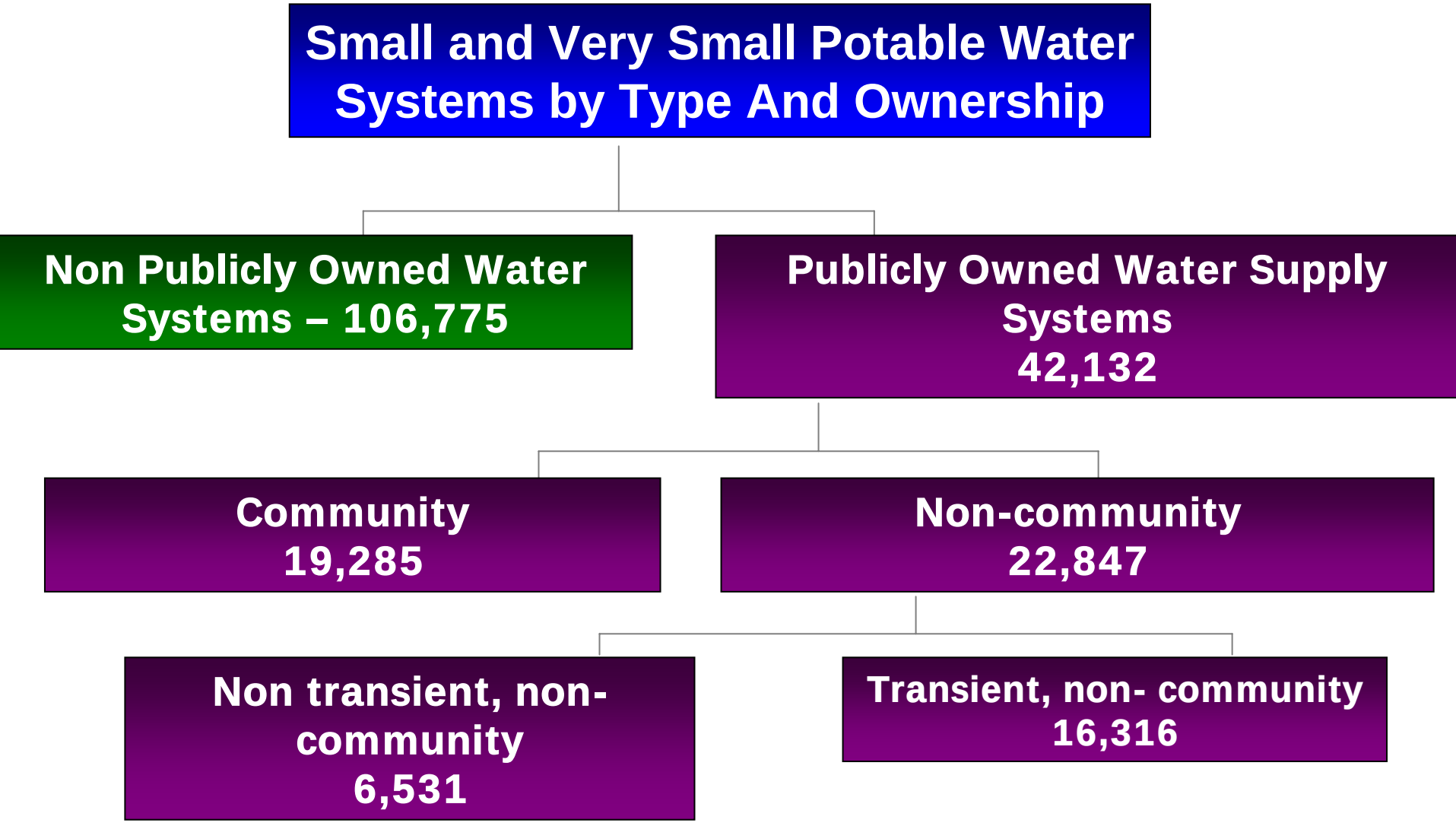


Large Diversity of Small Systems

- Day Care Centers
- Mobile Home Parks
- Rural Schools
- Factories
- National Parks
- Campgrounds
- Indian Reservations

Regulatory clasification PWSS

(amended from the Drinking Water Academy – PWS Supervision Program Module, numbers from EPA Pivot Tables, 2005)



Service Connections for Small Systems (Serving ≤3,300)

	CWS	NCWS
Median	85	1
Average	235	9
95th Percentile	900	37

Source: Active, current systems, from SDWIS January 2006 frozen tables

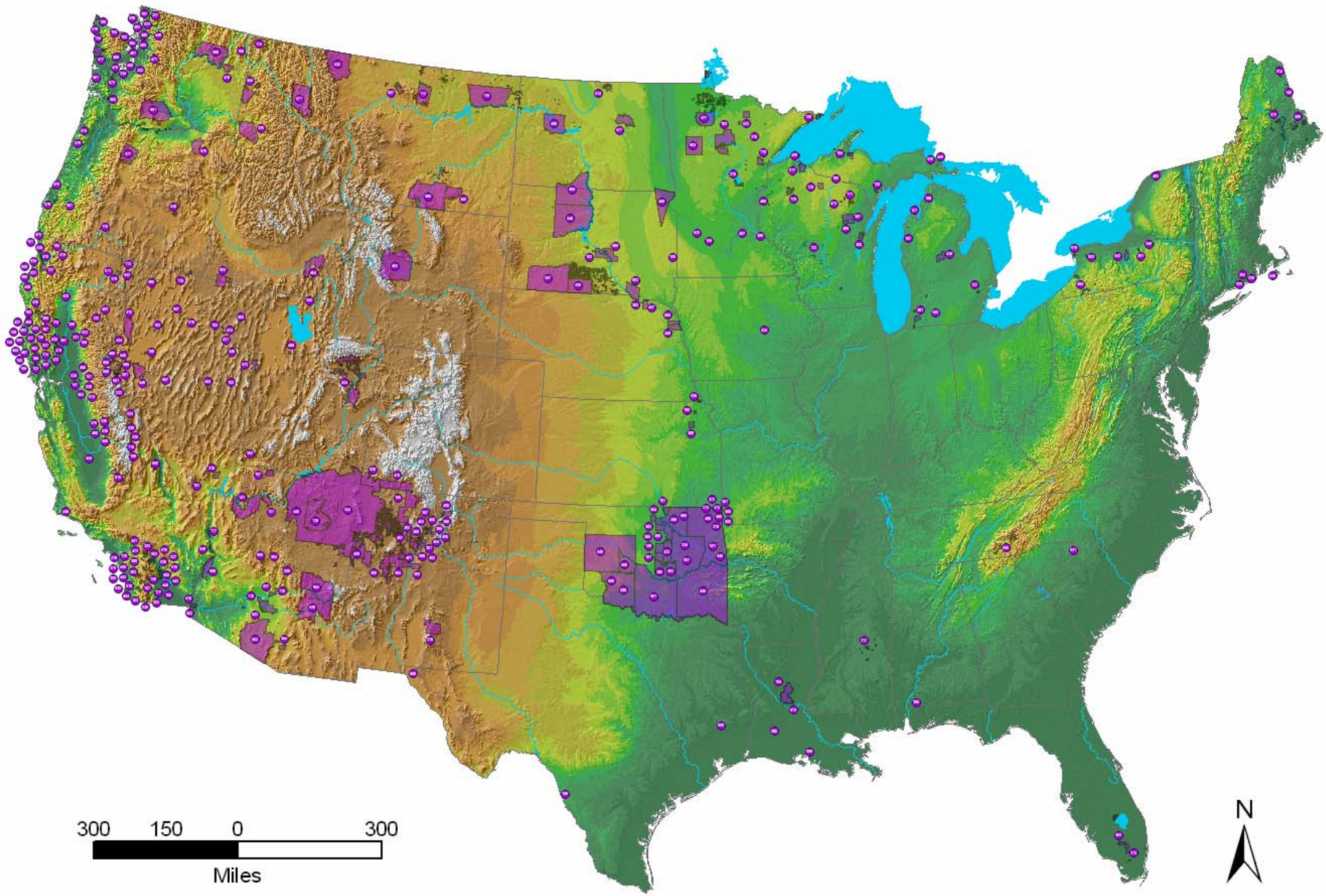
Special Ownerships
Tribal Drinking Water Systems

- **550 sovereign nations and recognized tribes**
  - 982 systems
  - 900,000 population served

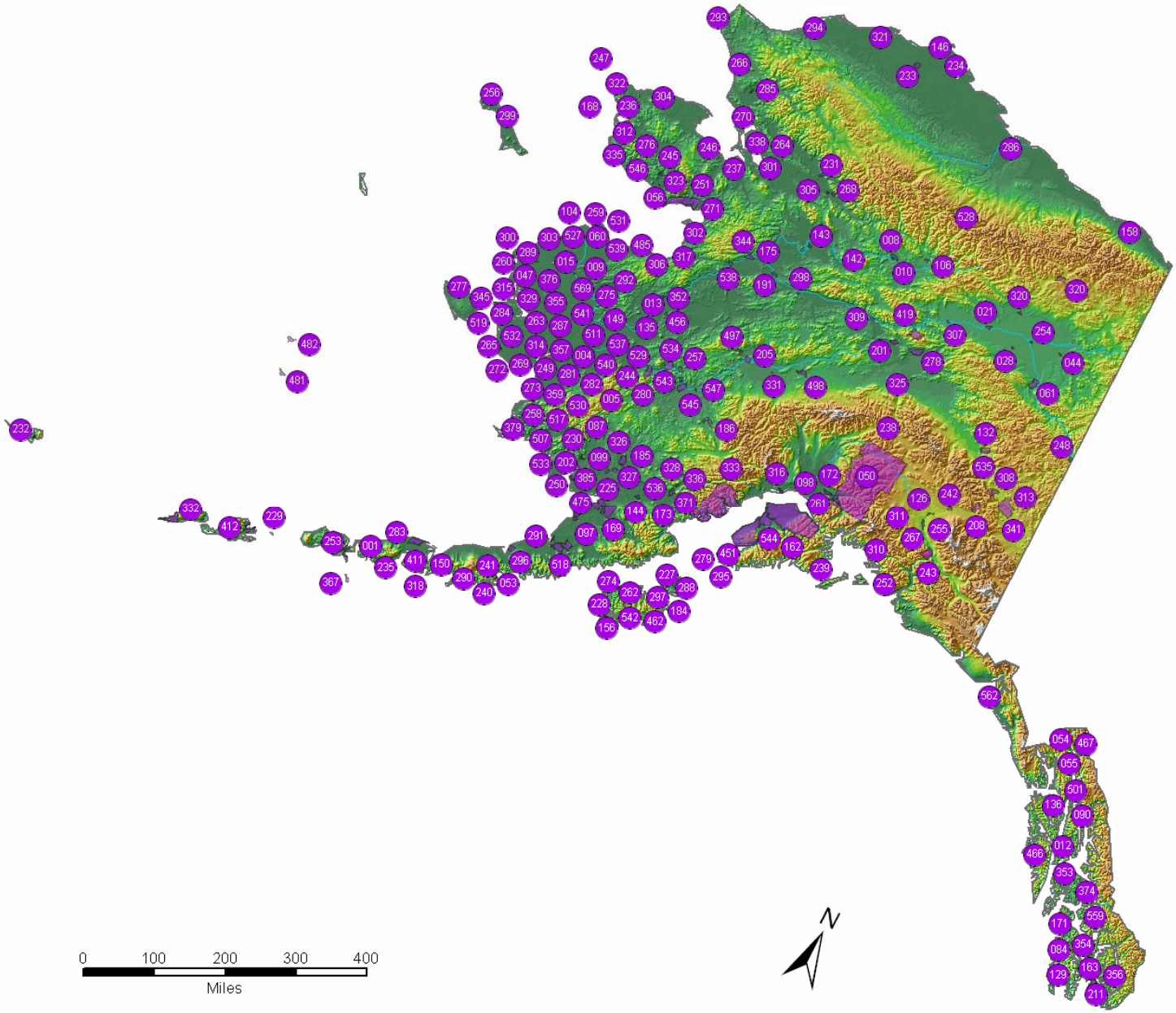
- Tribal Government varies on how tribal systems are financed, managed, and operated .

- Most tribal nations seek federal funding for drinking water infrastructure but struggle to meet the requirements for O&M

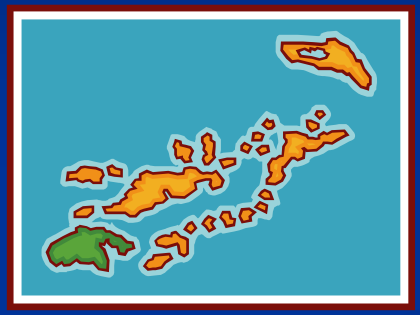
Tribes in the Lower 48 States



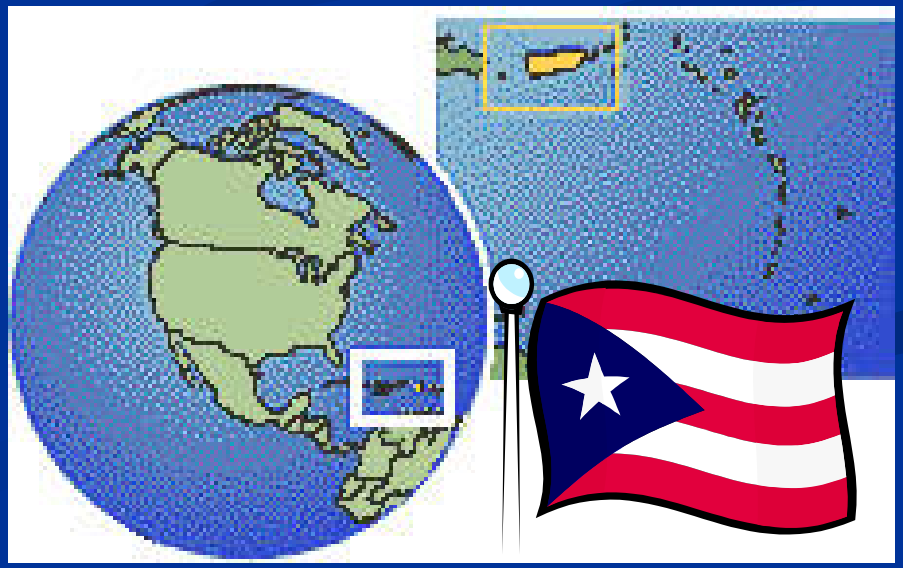
Alaskan Tribes



Special Ownerships
U.S. Possessions & Territories



- TCR Regulations affect all drinking water systems in Puerto Rico, Virgin Islands, etc.
- 7 territories
  - 1012 systems
  - 6.6 million population



Employees

Large Systems

- Hundreds or thousands of full time employees
- Trained Certified Operators
- Individual employees have specific tasks in potable water production and distribution only.

Career advancement opportunities

Small Systems

- Maybe one-half full time employee
- Might be Trained
- Low wages
- High job turnover rate
- Water is often ancillary to main purpose of facility (school. factory, campground, hospital)

Employees

Large Systems

- Professional staff to manage records, reports and test results.

Small Systems

- Limited resources to translate monitoring results and other information to operational changes or corrective action options

- May have to hire contractors for even routine tasks like sample collection

Small Systems – High Turnover Rate

- **Small System Operators *do not see* *their* jobs *as careers*.**

- **Wages are low.**

- **Water operation is *often* only *a* small part of the job. *The same person may* clean sewers, maintain roads, *collect solid waste*, mowing etc., etc.**

TCR Sampling

Large Systems

- Have professional resources to assess representative sample sites.
- May have dedicated sample sites
- Collected by trained and certified samplers.

Small Systems

- Representative sites may be difficult to assess and systems cannot afford professional assistance.
- May or may not be collected by a trained, certified sampler.

TCR Sampling

Large Systems

(Philadelphia)

- 360 Samples per month required by TCR
- 20 samples per day Mon.-Fri.

Small Systems

Systems serving ≤3,300

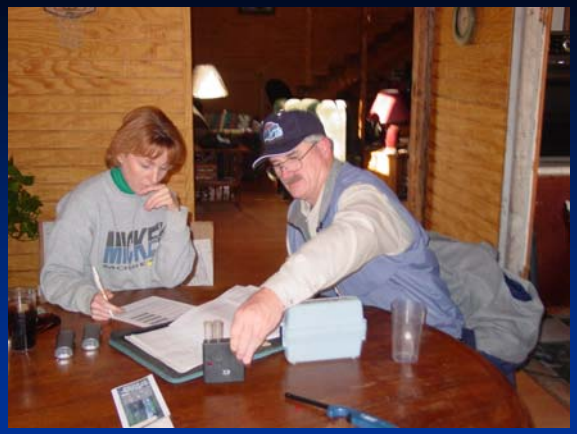
- 1 to 3 samples per month depending on population. Sometimes 1 per quarter or year depending on system type, source water, and sanitary survey results.
- Wide variability in sample collection requirements for very small systems amongst states.

TCR Sampling

Large Systems

(Philadelphia)

- Additional water quality testing done simultaneously
- Philadelphia collects more than 400 samples per month instead of the required 360 to cover vacancies, sick leave, bad weather. They collect ≥5,000 per year.
- Workload to State Agencies – may be more manageable than small systems
- Reports may be more likely to be timely and correct
- Problems may be noted



Small Systems

- No additional testing unless required – small systems do the minimum, which may be as much as they can do and possibly useful additional parameters are not done.
- Heavier workload to state agencies due to large number of small systems with limited ability to produce complete, correct reports.

Who Collects Samples ?

Large Systems

(Philadelphia)

- Full time Sample Collectors or Water Technology Assistants
- 2 samplers for 2 preset routine routes
- Cover about 10 TCR sample sites per day per sampler, plus 3 water treatment plants, 3 wastewater treatment plants, plus various storage facilities

Small Systems

- Part time or part of job of one (possibly the only) employee
- 1 to 3 samples per month depending on population. However, sometimes 1 per quarter or year depending on system type, source water, and sanitary survey results

Where is Sampling Done?

Large Systems

(Philadelphia)

- About 69 fixed sites
- Most sites have dedicated sampling stations
- In public buildings such as fire and police stations
- Some are sampled daily M-F while others once a week, two times a week, or three times a week

Small Systems

- Depending on size as little as one site.
- Usually no dedicated sampling stations
- Maybe a kitchen or laundry sink.

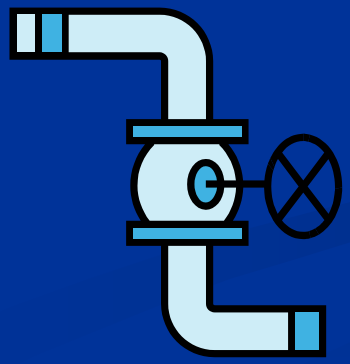
Responses to Positive Samples and Violations

Large Systems

- Philadelphia has a protocol
  - Investigations
  - Interviews
  - etc

Small Systems

- Little information on follow-up actions taken by small systems following positive samples or violations.
- May only take follow up actions when directed by the state



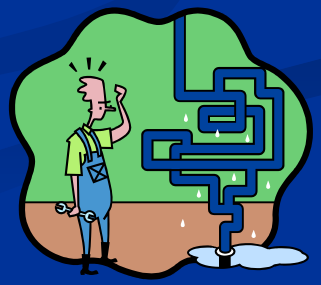
Repeat Sampling

Large Systems

- Triggers a minimum of 3 samples
- Within 5 services up and within 5 services downstream from the site of the positive sample.

Small Systems

- Triggers a minimum of 4 repeat samples and a minimum of 5 additional routine samples in the following month.
- Small systems do not consistently collect all triggered samples
- Size of system may be so small that there are no upstream or downstream connections.



Testing

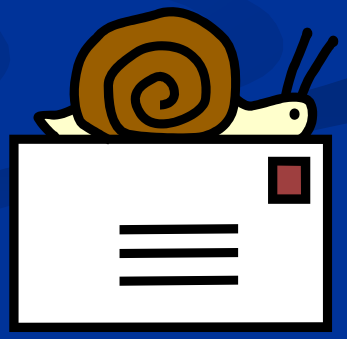
Large Systems

- Certified in-house laboratories
- Quick turn around on sample results

Small Systems

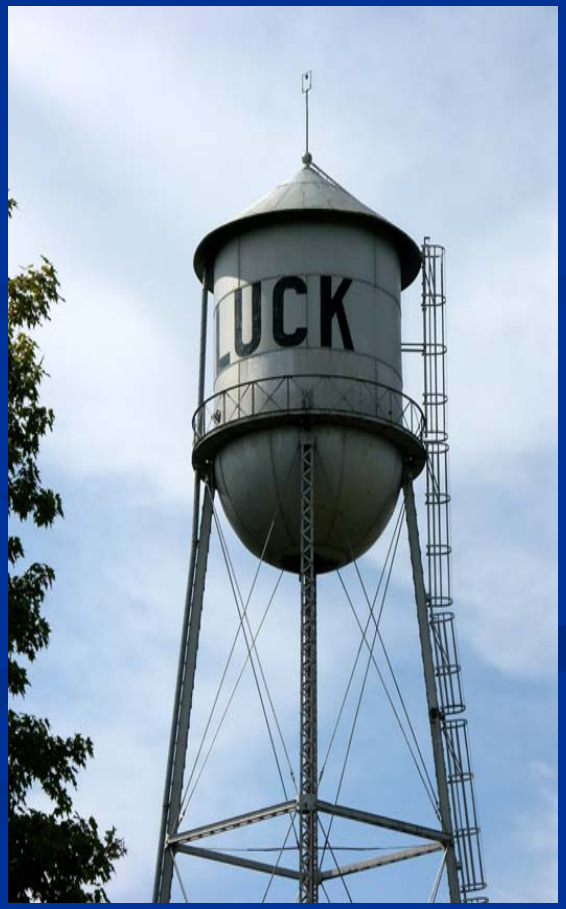
- Generally no in-house lab.
- Samples must be collected, packaged and shipped.

- Shipping time-critical samples usually requires overnight shipping services which may be unavailable and will be expensive.
- Longer delay in receiving sample results



Violations – Small vs. Large

- The sheer volume of small system violations and tight state resources means that not all small system violators will get the assistance they need to address their problem.



Customer Density

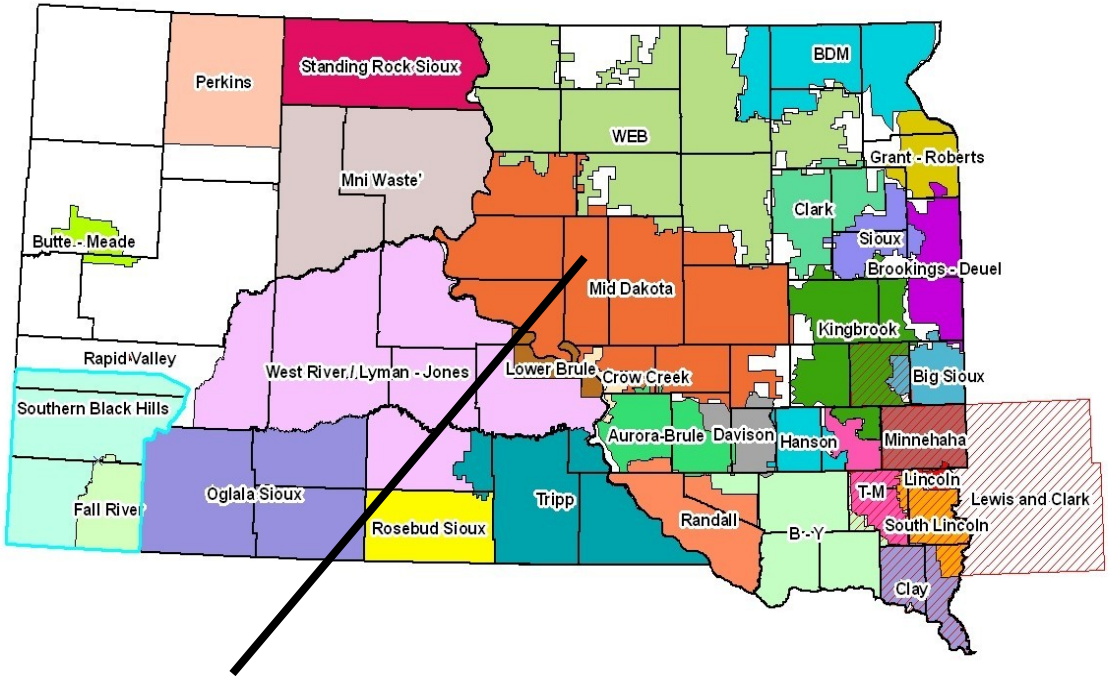
The City of Philadelphia Area

3,300 miles of pipe

500,000 service connections

@ 151 services per mile

South Dakota Rural Water Systems
40,000 Miles of Pipe



Mid Dakota Rural Water System

4,115 miles of pipe

5,097 service connections

@ 1 service per mile of pipe

Public Notification

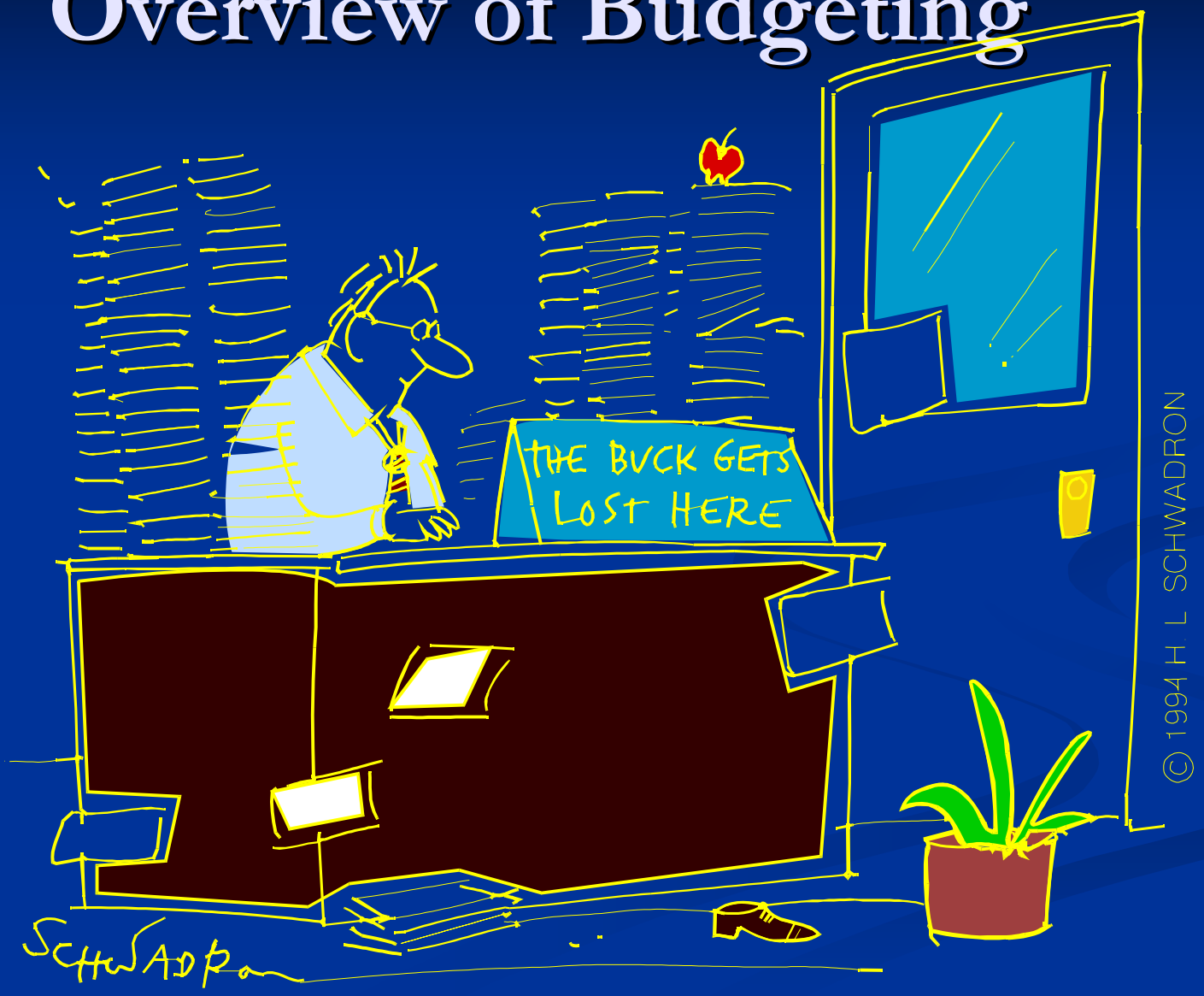
Large Systems

- Public notification triggered by 5% of routine positive samples (18 out of 360 samples for Philadelphia).
- Managed by a professional public relations officer.

Small Systems

- As little as 2 routine positive samples can trigger public notification.
- Many small systems are confused by notification requirements of existing regulation. Their need to be told what to do places additional stress on State staff.

Overview of Budgeting



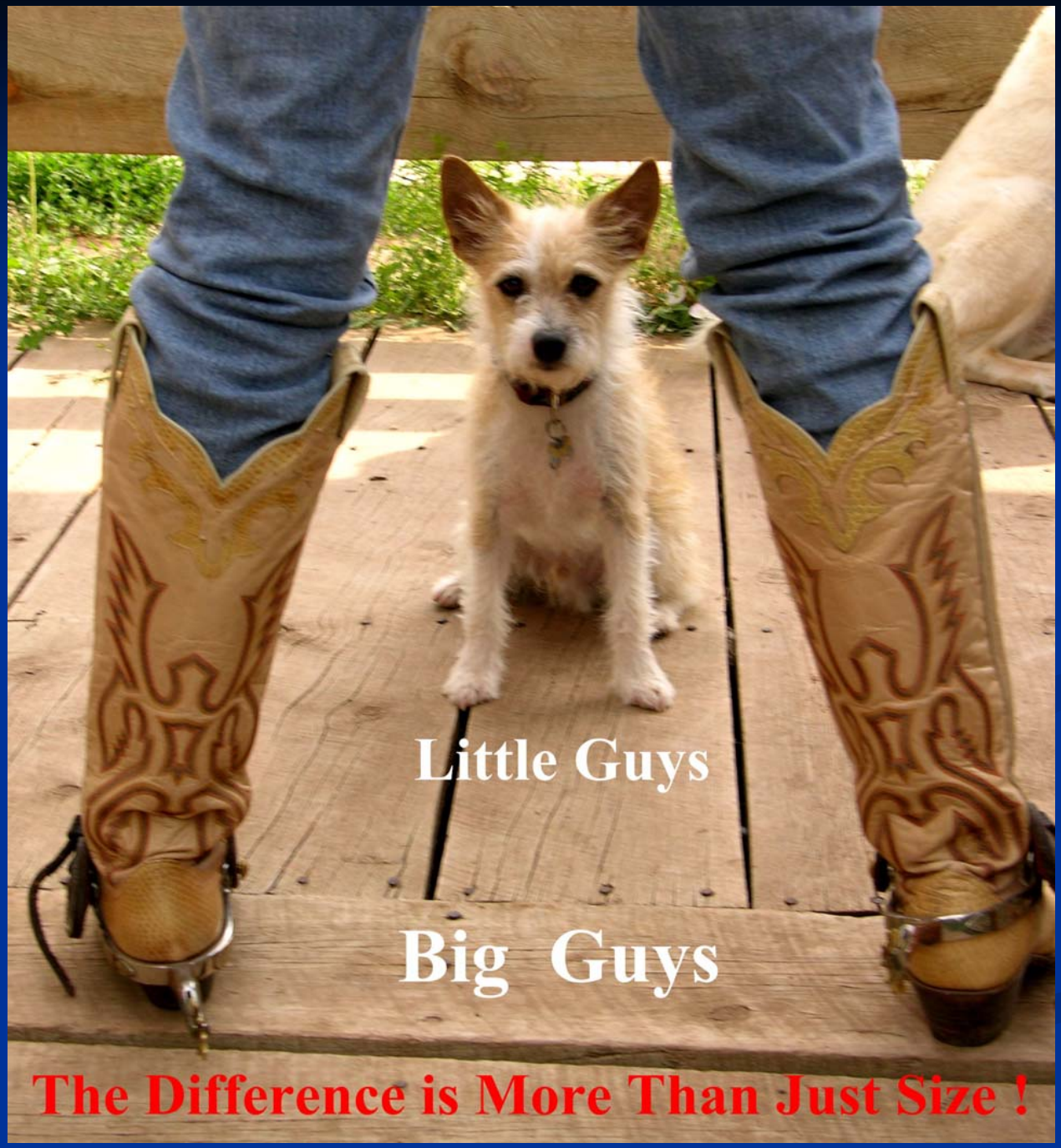
Sampling Costs

Large Systems (Serving ≥100,000)

- Small % of Total Budget (Wages, equipment, testing and reporting)
- In-house Labs.
- Economy of Scale

Small Systems (Serving ≤3,300)

- High % of Total Budget (Wages, equipment, testing and reporting)
- Must use private Labs.
- Samples must be shipped by expensive overnight shipping or private carrier


Little Guys
Big Guys
The Difference is More Than Just Size !

Appendix A-1

		<500		501-3,300		3,301-10,000	
		Systems	Population	Systems	Population	Systems	Population
CWS	unknown	9	1,652	3	4,377	NA	NA
	gw	26,282	4,234,070	10,209	13,929,151	2,658	15,134,120
	sw	3,372	690,026	3,911	6,119,272	2,090	12,380,594
	Subtotal	29,663	4,925,748	14,123	20,052,800	4,748	27,514,714
NTNCWS	unknown	3	141	NA	NA	NA	NA
	gw	15,917	2,207,480	2,548	2,508,977	85	449,898
	sw	428	75,007	157	198,234	17	107,844
	Subtotal	16,348	2,282,628	2,705	2,707,211	102	557,742
TNCWS	unknown	19	973	2	3,000	NA	NA
	gw	81,631	7,127,312	2,584	2,486,784	86	459,247
	sw	1,700	169,919	132	170,345	25	139,259
	Subtotal	83,350	7,298,204	2,718	2,660,129	111	598,506

Source: SDWIS FY05Q4, frozen Jan '06

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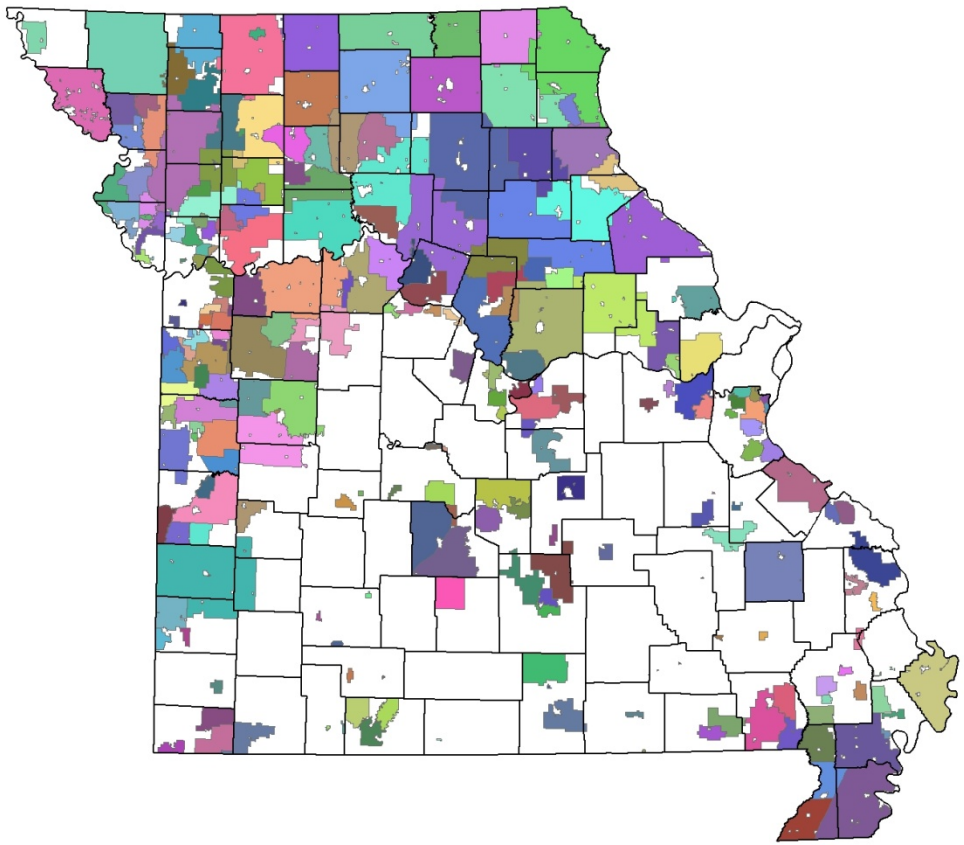
Appendix A-2

- Systems serving <10,000 make up 97% of systems and serve 23% of population (Source: Active, current systems, from SDWIS January 2006 frozen tables)
- Smaller systems may only have 1 customer per mile of pipe or a few hundred customers in thousands of square miles.
- Small CWSs and NTNCWs have fewer service connections per system

System Type	Average Service Connection Per System (Systems serving <10,000)	Average Service Connection Per System (Systems serving >10,000)
CWS	415	16927
NTNCWS	10	1954
TNCWS	9	10

Source: Active, current systems, SDWIS January 2006 frozen tables

Appendix A-3 Distribution of Rural Water Districts in Missouri



Appendix A-4 Sample Processing

- Varies with system, lab, and State
- From EPA, DWPD records
  - In 20 States, Lab must send results to State
  - In 11 States, State provides analysis
  - In 6 States, State pays for analysis for all systems.
  - In 43 States, State does not pay for analysis for any systems
  - In 20 States, lab must send results to State

Appendix A-5
Tribal Drinking Water Systems

- 550 plus sovereign nations and recognized tribes
- Tribal data is often combined with non-tribal information
    - weakens the value of any distinct tribal data
    - leads to erroneous analysis and interpretation
- Lack of current information/understanding on how tribal systems are financed, managed, and operated
- Most tribal nations seek federal funding for drinking water infrastructure but struggle to meet the requirements for O&M

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Tribal Systems (cont'd)

- Native American communities mostly fall below the medium household income levels in their states
- Tribes may need to seek federal funding through the federal budgetary process to address TCR revisions
- Tribal governments are under stress to fund other essential programs too. Today there is greater competition for fewer funds.
- Regular involvement and outreach is important to solicit input and inform tribes about progress and financial implications

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Number of Tribes based on http://www.epa.gov/tribalportal/whereyoulive/regions.htm

- Region 1 =10 tribes
- Region 2 = 7 tribes
- Region 3 = 0
- Region 4 = 6 tribes
- Region 5 = 35 tribes
- Region 6 = 67 tribes
- Region 7 = 9 tribes
- Region 8 = 27 tribes
- Region 9 = 77 tribes
- Region 10 = 270 tribes

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Appendix A-6
Population Served per Mile of Existing Pipe, by Ownership
(Excludes Wholesalers With No Retail Customers)

Population Served	Publicly Owned Systems		Privately Owned Systems	
	Mean	Median	Mean	Median
Less than 100	62	65	130	99
101-500	88	75	187	148
501-3300	134	115	201	90
3,301-10,000	220	168	140	87
10,001-50,000	231	196	346	105
50,001-100,000	279	221	236	223
100,001-500,000	445	275	246	214
More than 500,000	465	315	340	380

Source: EPA, CWSS 2000