Total Coliform Rule Within A Safe Drinking Water Act Context

Doug Owen
TWG Representative

TCRDS Federal Advisory Committee Meeting

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This Meeting's Presentations

Objectives

Provisions

System compliance

Improvement

Research

TCR within SDWA Context

Presentation Objectives

- Respond to request from Advisory Committee to understand:
  - What aspects of the current matrix of SDWA rules respond to the TCR rule objectives?
  - What are the strengths / limitations of how the current rule elements address the rule objectives?
  - What potential opportunities are there for improvement / refinement of the rule objectives?

Specific Existing Rule Linkages

- Relationships based on monitoring results
  - TCR TC+ triggers source water fecal indicator monitoring under GWR for systems without 4-log virus treatment (effective 2009)
  - SWTR source water turbidity samples > 1 NTU in unfiltered systems triggers requirement for additional TC samples near DS entry
- Relationships based on monitoring requirements
  - Under SWTR and Stage1 and 2 DBPRs, different types of systems are required to collect disinfectant residual samples at same time/location as TCR TC samples

Total Coliform Rule Objectives

- To evaluate the effectiveness of treatment,
- To determine the integrity of the distribution system, and
- To signal the possible presence of fecal contamination

TCR objectives are being addressed (at least partially) through multiple rules, and with varying levels of effectiveness.

TWG Analysis Approach

- Consider extent objectives are met by drinking water system type:
  - Surface water
  - Ground water
    - Disinfected (meets GWR treatment requirements)
    - Not disinfected (does not meet GWR treatment requirements, but some may apply residual or intermittent disinfectant)
      - With and without multiple customer connections
- Reflects suite of rule requirements including TCR
- Consider multiple barrier approach, using best professional judgment

Description of System Categories

Source	Disinfection	CWS / NTNCWS / TNC	Characterizing Dist. System
Surface Water	All systems disinfect to 3-log *G. lamblia* or greater	All CWS, NTNCWS, and TNC; 83% of surface systems are CWS	Surface water systems tend to serve larger populations and are typically thought of as having an extensive DS.
Ground Water	Disinfected to 4-log virus	Currently infrequent; est. 20% of GW systems post-GWR (≥2009)	Larger systems are more likely to disinfect and more likely to have a DS.
	Secondary residual	EPA estimates 49% CWSs apply a residual; much less frequent in NCWSs	Larger systems are more likely to disinfect and more likely to have a DS.

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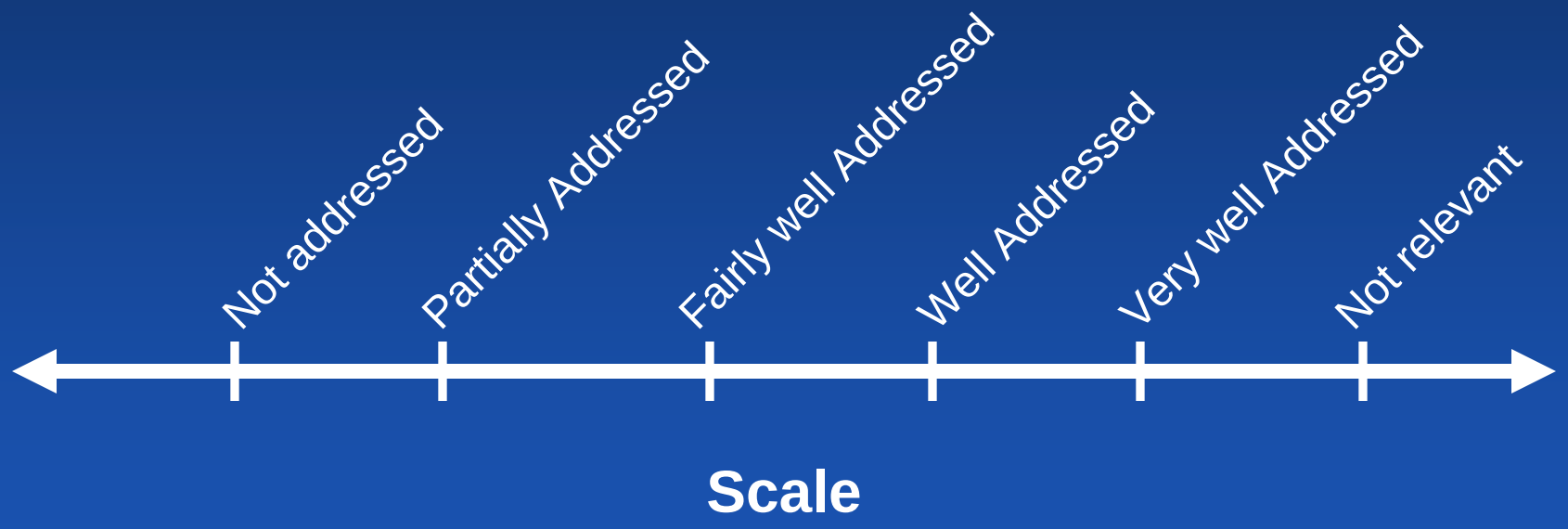
Description of System Categories

Source	Disinfection	CWS / NTNCWS / TNC	Characterizing Dist. System
Ground Water	Undisinfected	Majority of PWS; roughly 80% of NCWSs	Some NCWS and most CWS have multiple connections and resultant external piping.
			Many NCWS and a few CWS have a single service or serve a limited number of structures with limited external piping.

Objectives Assessment Scale



Surface Water

- **Evaluate treatment effectiveness**
  - Ongoing treatment efficacy monitoring (e.g., turbidity, CT, etc.) (SWTRs)

Very well Addressed

- **Determine distribution system integrity**
  - Maintenance of disinfectant residual (SWTR)
  - Routine monitoring for TC and monitoring of *E. coli* in distribution system (TCR)

Well Addressed

Surface Water (continued)

Fairly Well Addressed

- **Signal possible fecal contamination**
  - Ability to meet this objective governed by the previous two objectives, however
    - Disinfectant residual and TC/EC measurements may be too infrequent to capture short-term contamination events

	Total	Percent of All	25-500	501-3,300	3,301-10,000
Number of Systems	14,500	9%	5,600	4,200	2,100
Population Served	200,000,000	66%	900,000	6,600,000	12,700,000

Disinfected Ground Water

- **Evaluate treatment effectiveness**
  - Ongoing treatment efficacy monitoring (GWR)

Very well addressed

- **Determine distribution system integrity**
  - Monitor for (not maintain) a disinfectant residual (Stage 1 DBPR)
  - Routine monitoring for TC and monitoring of *E. coli* in distribution system (TCR)

Fairly well addressed

Disinfected Ground Water (continued)

Partially addressed

- **Signal possible fecal contamination**
  - Ability to meet this objective governed by the previous two objectives, however
    - GW systems are not required to maintain a DS residual
    - Disinfectant residual and TC/EC measurements may be too infrequent to capture short-term contamination events

	Total	Percent of All	25-500	501-3,300	3,301-10,000
Number of Systems	31,300	20%	23,600	5,400	1,300
Population Served	38,900,000	13%	3,000,000	7,100,000	7,500,000

Systems "Without" a Distribution System

- No consensus definition of a "distribution system"
- Many small systems have limited external piping
  - TNCWSs (e.g., restaurant),
  - NTNCWSs (e.g, school), and
  - CWSs (e.g., apartment building)
- To **approximate** the number of systems "without" a distribution system, we:
  - Used the number of NCWS serving ≤500 persons as a proxy for all systems without a distribution system
    - Only applied proxy to undisinfected groundwater systems, reflecting post-GWR conditions
  - All other systems were counted as having a distribution system

Undisinfected Ground Water with Distribution System

- **Evaluate treatment effectiveness**

  Not relevant

  - Since treatment is not required for all GW systems, objective does not address untreated systems.
  - TCR and GWR identify systems that need treatment but have limitations due to monitoring frequency and types of fecal contamination that may not be detected.

- **Determine distribution system integrity**

  Partially Addressed

  - No requirement to monitor for or maintain a disinfectant residual
  - Routine monitoring for TC and monitoring of *E. coli* in distribution system (TCR)

Undisinfected Ground Water with Distribution System (continued)

Partially Addressed

- **Signal possible fecal contamination**
  - Ability to meet this objective governed by source water quality and DS integrity, however
    - TC/EC measurements may be too infrequent to capture short-term contamination events
    - Fecal indicator testing (GWR) done only after TC results obtained; delay in results affects timeliness of source water fecal contamination detection

	Total	Percent of All	25-500	501-3,300	3,301-10,000
Number of Systems	27,500	18%	15,600	9,800	1,500
Population Served	49,500,000	16%	2,500,000	11,700,000	8,400,000

Undisinfected Ground Water without Distribution System

- **Evaluate treatment effectiveness** — **Not relevant**
  - Since treatment is not required for all GW systems, objective does not address untreated systems.
  - TCR and GWR identify systems that need treatment but have limitations due to monitoring frequency and types of fecal contamination that may not be detected.

- **Determine distribution system integrity** — **Not relevant**

Undisinfected Ground Water <u>without Distribution System</u> (continued)

Partially Addressed

- **Signal possible fecal contamination**
  - Ability to meet this objective governed by the source water quality
    - In these mostly small systems TC/EC measurements too infrequent to timely capture some contamination events
    - Fecal indicator testing (GWR) done only after TC results obtained; delay in results affects timeliness of source water fecal contamination detection

	Total	Percent of All	25-500	501-3,300	3,301-10,000
Number of Systems	83,400	53%	83,400	0	0
Population Served	8,000,000	3%	8,000,000	0	0

Perspective on TCR Objectives

- TCR objectives are being addressed (at least partially) through multiple rules, and with varying levels of effectiveness. A single rule requirement may address more than one objective.
  - Effectiveness of addressing objectives is related to frequency and location of monitoring under multiple rules
- The TCR relies on a microbial indicator to identify loss of integrity; there are instances where chemical contaminants could enter undetected
- Effectiveness of the current rule structure is in part a result of activities taken by PWSs beyond the rule requirements

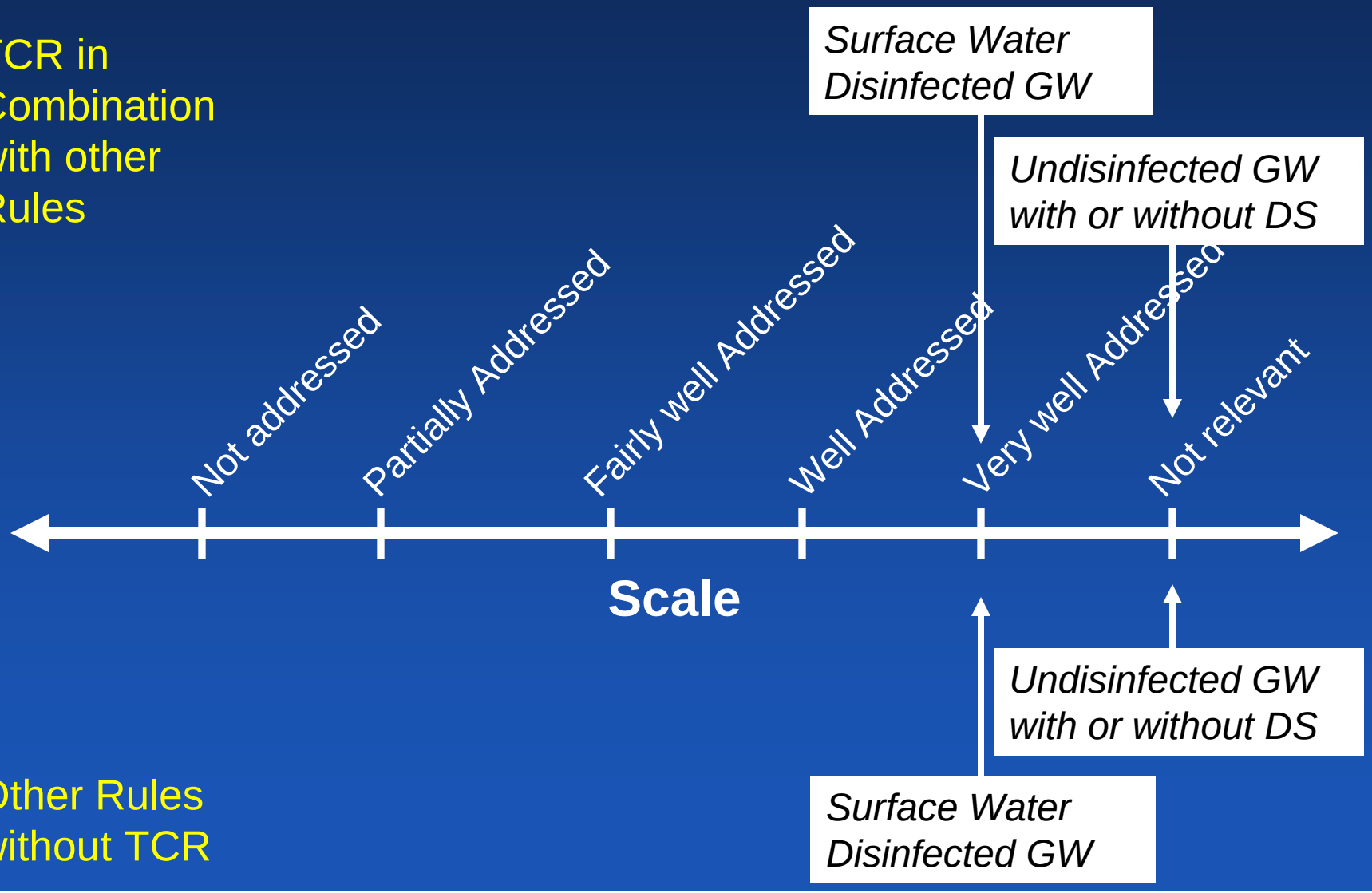
Sanitary Survey

Source/System Type	Survey Frequency
SW/GWUDI, CWS	Every 3 years
SW/GWUDI, NCWS	Every 5 years
GW CWS	Every 3 years, first completed by 2012
GW NCWS	Every 5 years, first completed by 2014

Sanitary surveys provide an opportunity for State contact with PWSs, particularly small systems

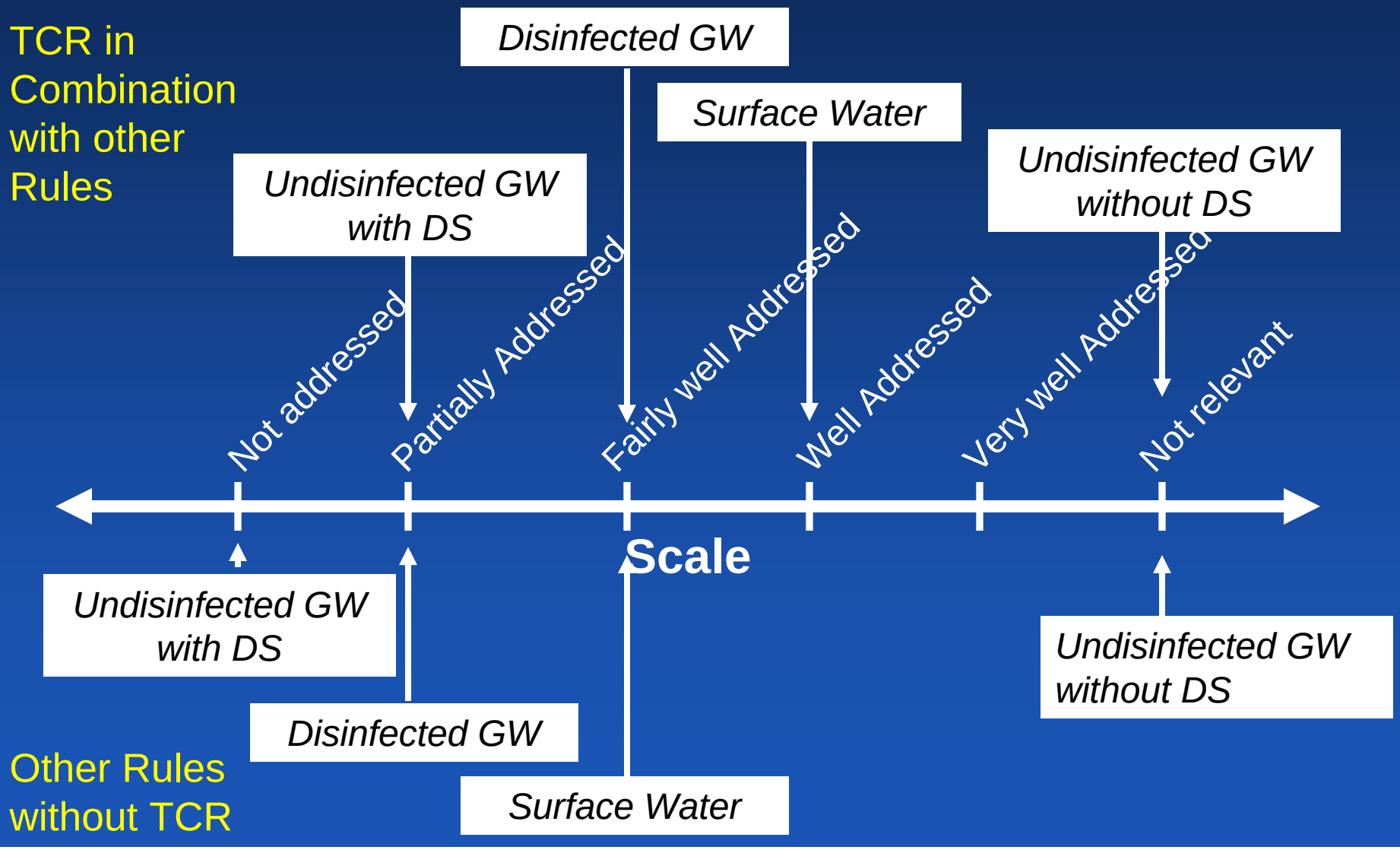
Evaluate Treatment Effectiveness

TCR in Combination with other Rules

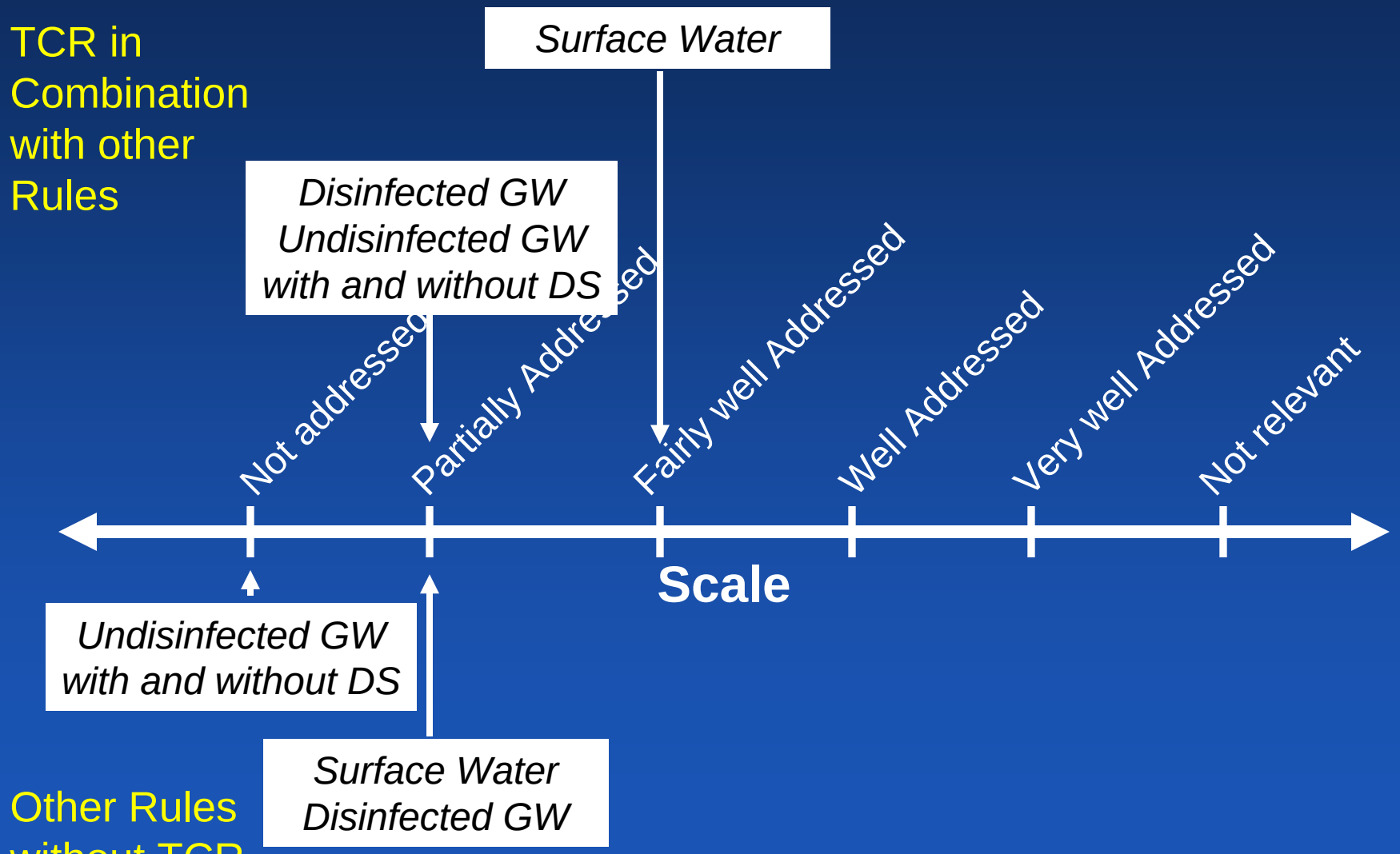


Other Rules without TCR

Determine Distribution System Integrity



Signal Possible Fecal Contamination



Summary

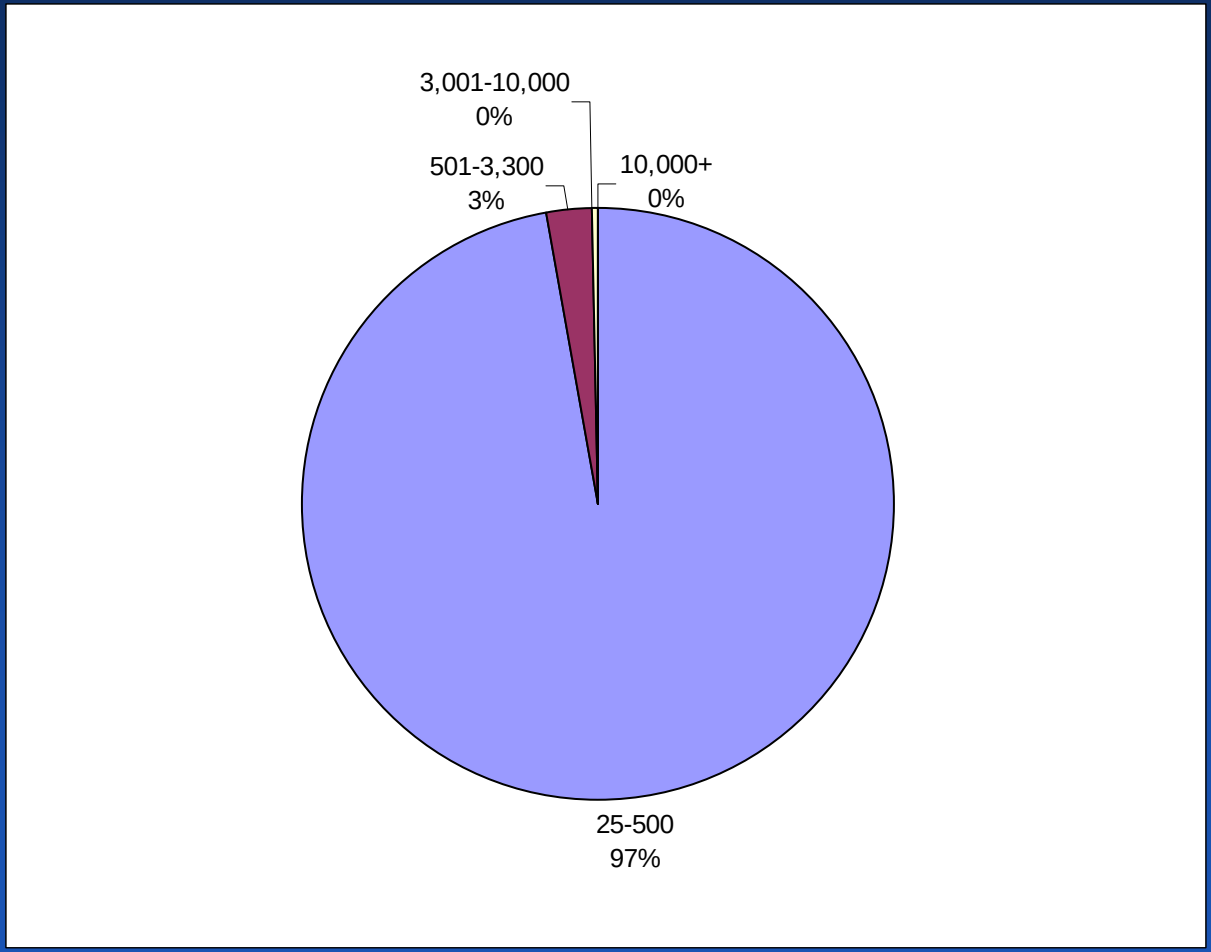
- The current TCR contains components that address each of its stated objectives with room for improvement particularly in identifying fecal contamination in undisinfected GW systems
- The TCR cannot be effectively evaluated in isolation - there are important synergies with SWTR, GWR, etc.
- Evolution of SDWA regulations provides an opportunity to better integrate the rule framework to reduce complexity while maintaining or enhancing effectiveness

Summary (continued)

- Recognize that the GWR is risk-based.
  - The remaining undisinfected GW systems will have higher quality sources, therefore sources will remain untreated
- Suggest expanding first TCR objective to read: “Evaluate treatment effectiveness and/or indicate contamination from the source”
  - This addition would recognize the relevance of TCR for identifying systems that need corrective action or treatment of the source water under the GWR

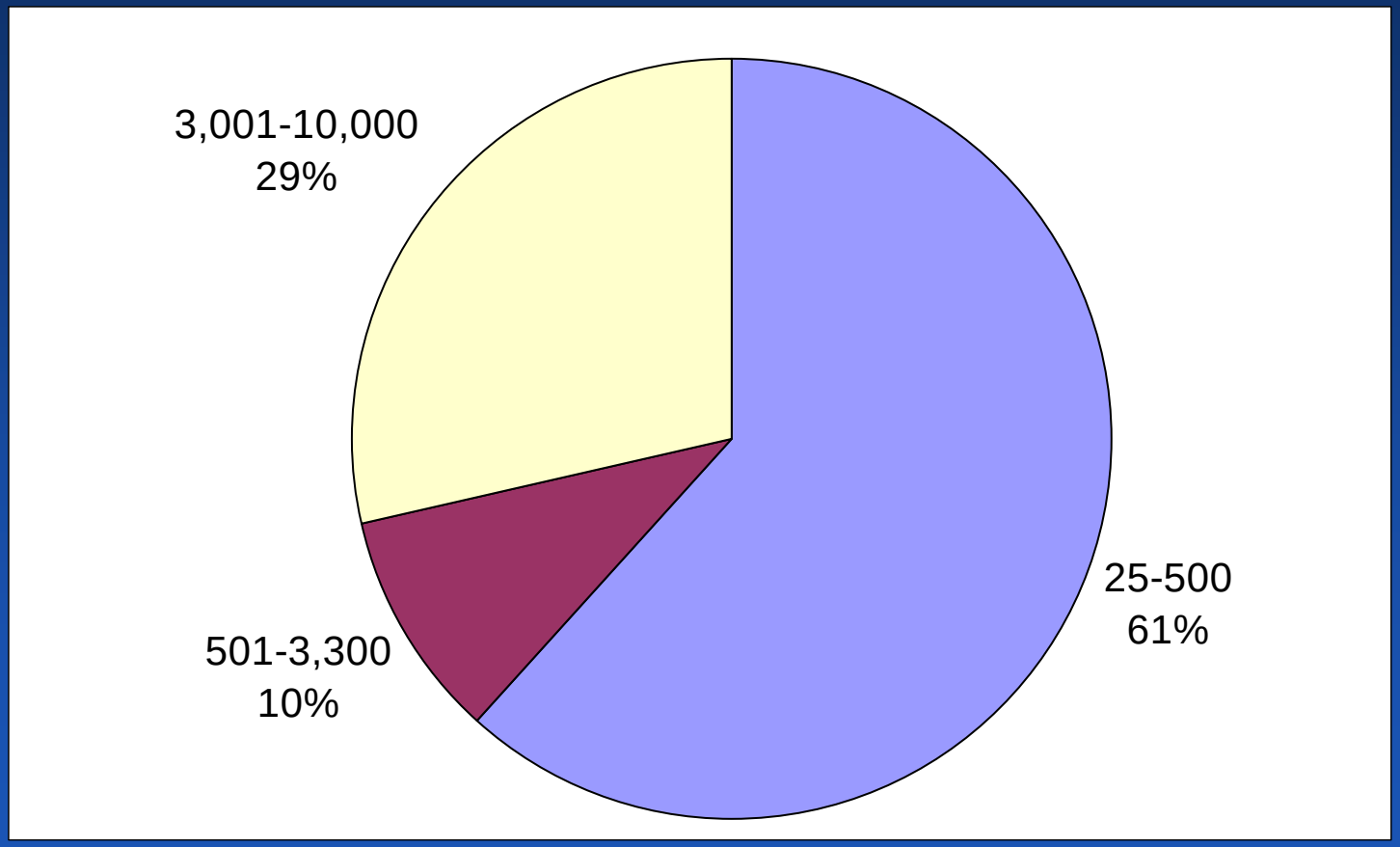
Appendix

Transient Non-Community Systems



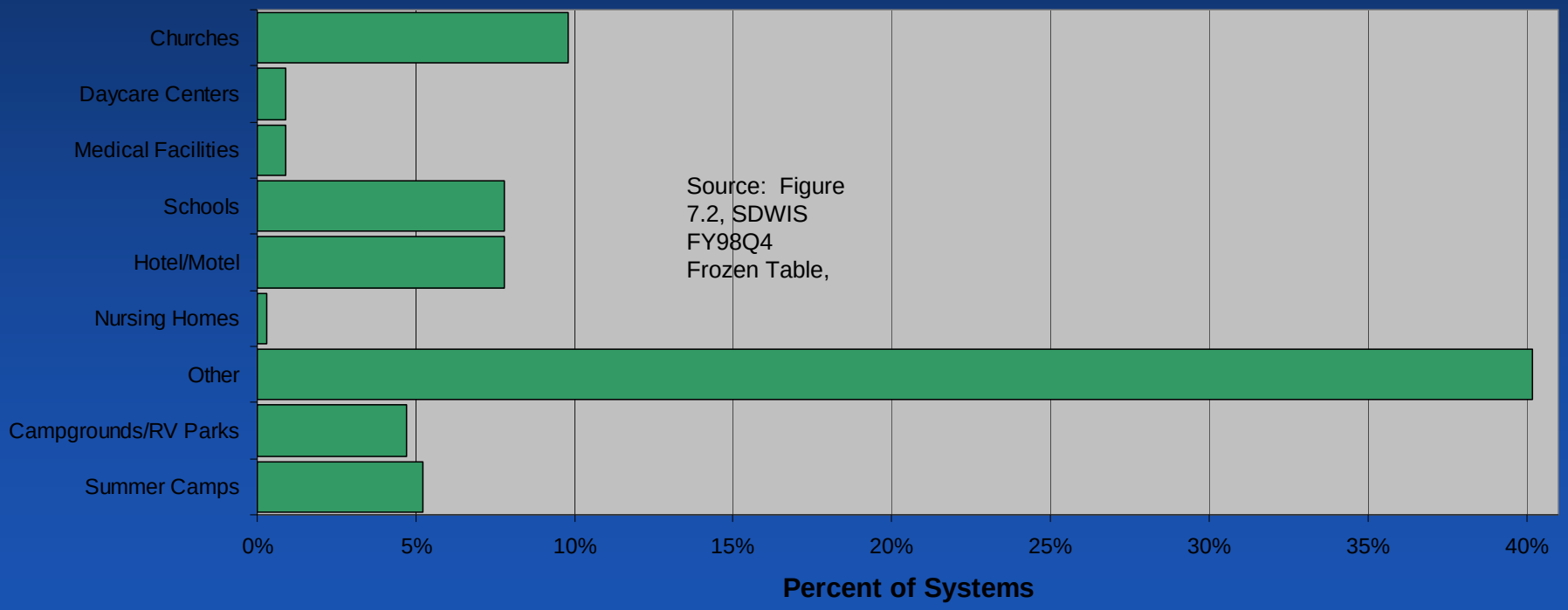
Source: Figure 7.10, SDWIS FY98Q4 Frozen Table

NTNCWS by System Size



Source: Figure 7.3, SDWIS FY98Q4 Frozen Table

Ownership of NCWS



Source: Figure 7.2, SDWIS FY98Q4 Frozen Table