

**TABLE 6** Scientific and policy needs for improving water system disaster response and recovery

Recommendations	Proposed responsible groups
1. Obtain wildfire-specific personal protective equipment (PPE) and train utility staff on how to prevent injuries.	Utility
2. Acquire or identify backup emergency generators so that a power loss lessens the chance pressure loss occurs, fire-fighting support is jeopardized, and distribution system contamination occurs.	Utility
3. Establish mutual aid agreements for personnel to assist in system repair, water sampling, analysis, and equipment access enabled through the Water/Wastewater Agency Response Network (WARN).	Utility
4. Install physical interconnections with neighboring utility distribution systems to support emergency pressure and water needs.	Utility
5. Conduct department, organization, and multi-organization exercises to practice addressing the operational, managerial, scientific, and communication challenges during and following a wildfire.	Utility
6. Top off all finished water storage tanks in anticipation of an approaching fire, a power loss, or distribution system damage that can prompt water leaks.	Utility
7. Contact the state water testing laboratory and commercial laboratories to determine who guarantees to provide 24- to 72-h turnaround times for emergency post-fire sampling/analysis support.	Utility
8. Identify the conditions where untreated or partially treated source water would be sent into the water distribution system to support fire-fighting activities.	Utility, State
9. Upgrade distribution system construction requirements, such as pressure zone separations, service line backflow prevention devices, auto-shutoff meters/valves, and selective plastic use to reduce the rate and magnitude of pressure loss, water loss, and impact of chemical contamination.	Utility, State
10. After a fire, require water meter removal and the physical disconnection of damaged and destroyed properties from the water distribution system if no functional backflow prevention device exists.	Utility, State
11. Require chemical testing of the property service line, install a backflow prevention device, or replace infrastructure before damaged property services are reconnected to the distribution system.	Utility, State
12. As part of employee training and organizational culture, share experiences about responding to and recovering from disasters that impact water distribution systems.	Utility, State, and Federal
13. Establish and maintain relationships with subject matter experts on water distribution system contamination response and recovery actions, technical support, and decision making.	Utility, State, and Federal
14. Develop evidenced-based standard practices for post-fire VOC and SVOC water sampling and analysis for water mains, hydrants, blowoffs, storage tanks, service lines, and other infrastructure.	Research, State, Federal
15. Review state water testing laboratory capabilities and identify commercial laboratories that guarantee to provide utilities 24 h to 72 h turnaround time emergency post-fire sampling/analysis support. Share this with state agencies and utilities.	State, Federal
16. Investigate the conditions that prompt chemical contamination of distribution systems and locations where contamination becomes sequestered to better prevent and respond to the hazard.	Research
17. Identify the public health risks associated with short-term exposure to wildfire-contaminated water and develop evidence-based contaminated water use recommendations.	Research, Federal
18. Characterize VOC and SVOC fate in distribution networks that contain metal and plastic materials and also consider scales and biofilms.	Research
19. Conduct a risk tradeoff analysis for flushing chemically contaminated water from distribution systems to storm drains and the ground, focused on rapidly returning infrastructure to safe use.	Research, Federal
20. Conduct a financial impact study that considers water utility wildfire response needs, expenses, insurance, and reimbursement experiences. Also, quantify economic impacts on establishments such as schools and businesses that need clean water to provide service.	Research, State, Federal

Note: State organizations may include the *Safe Drinking Water Act* primacy agency and health departments; Federal organizations may include the USEPA and CDC.

requirements (US Congress, 2018), but several actions can improve water utility and state-level preparation, response, and recovery (Table 6). Based on the lessons from

the present work, the literature, and the author's experience, the responsibility for each recommendation was assigned to one or more groups (Utility, State, Federal, and