Colorado National Wastewater Surveillance System Center of Excellence (NWSS CoE)

Right-Sizing Your Wastewater Surveillance Program

Pre-Webinar Workbook

COLORADO
Department of Public Health & Environment

UNIVERSITY OF DENVER

In This Workbook

Section 1: Background

Dear wastewater surveillance colleagues,

As we look to the future of wastewater surveillance, it is increasingly clear that our programs must evolve to align with uncertain funding scenarios and changing public health priorities. While we have all worked to prove that wastewater surveillance is a valuable tool for early detection, situational awareness, and public health decision-making, we must now thoughtfully assess how to sustain our National Wastewater Surveillance System in a climate of limited funding.

Our collective challenge, proposed by the CDC in June 2024, is to right-size our programs. We must identify the elements of each of our programs that are critical to preserve and streamline operations, while continuing to deliver meaningful wastewater surveillance data with fewer resources.

We recognize that each jurisdiction has unique features that don't allow for a "one-size fits all" right-sizing approach. For this reason, we have created this workbook to help your program identify key elements to consider during your system evaluation, including staff who should be involved. After completing the workbook, we encourage you to attend our **webinar from 10–11:30 a.m. MST on Wednesday, Jan. 14, 2026,** to ask questions of national panelists who have experience in right-sizing their programs. **Please submit your questions no later than the close of business on Wednesday, Jan. 7, 2026 using this form**. If you cannot use Google products, you can email your questions to cdphe_dcphr_nwss_coe@state.co.us.

We've structured the guidance to allow all programs, regardless of resources, to choose the data sources they can use to evaluate their programs. While right-sizing your program may seem overwhelming, remember that it is an ongoing process, allowing you to refine your model through regular evaluations. Each of us has a role in right-sizing our programs. By working together, we can plan for a sustainable future for NWSS and ensure that wastewater surveillance remains a trusted, strategic component of our public health infrastructure. Should you have additional questions during completion of the workbook or after the webinar, please reach out to the Colorado Wastewater Surveillance Center of Excellence at cdphe_dcphr_nwss_coe@state.co.us.

Thank you for your dedication to wastewater surveillance work. Your creativity will be essential as we navigate this next phase together.

Allison Wheeler, MSPH

Co-Director, Colorado Wastewater Center of Excellence

Colorado Department of Public Health and Environment

Section 2: Training Outline and Goals

Training Program Outline

1. **Workbook** - Before attending the webinar, gather your WWS team to review and complete the activities in this workbook. We recommend setting aside about two hours to work through the exercises, which are designed to spark discussion and guide your right-sizing planning process. Your conversations will likely generate questions. Please submit them in advance of the webinar using **this form** so we can synthesize participant feedback and address as many questions as possible during the live session. If you cannot use Google products, you can email your questions to **cdphe_dcphr_nwss_coe@state.co.us**.
2. **Webinar** - After completing the workbook, join the live webinar to explore Colorado's Sentinel Model in greater depth, hear additional experiences from other wastewater surveillance colleagues, and discuss your team's findings.
3. **Plan** - Following the webinar, additional resources will be available on the Colorado NWSS CoE webpage to help you create a well-formatted, printable document outlining your right-sizing plan. These resources will assist you in ranking sample collection sites according to the parameters identified in your workbook activi-

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Training Program Goals

By the end of this training program, you should be able to:

- Define the purpose of your WWS program.
- Select data sources, tools, and resources that align with your program's purpose, goals, and budget to determine appropriate sampling sites.
- Develop a right-sizing plan that includes tasks, roles, data sources, and other resources needed for implementation.

Section 3: Case study

Choosing Colorado's sentinel surveillance site model

Since 2020, the Colorado Department of Public Health and Environment (CDPHE) has conducted statewide wastewater surveillance in collaboration with more than 50 wastewater utilities. In 2024, to create a more cost-effective and sustainable system, CDPHE transitioned to a sentinel model with supplemental emergency surveillance sites, strategically selecting utilities. Before the transition, we evaluated a series of sentinel models to determine which model would align with regional trends and represent the statewide population using historical SARS-CoV-2 data. Active utilities in the program were reduced by two-thirds, but the sentinel system continues to represent about 50% of Colorado's population.

Utilities that were previously active in the wastewater surveillance program, but not included in the sentinel site model, were invited to join the emergency wastewater surveillance system. This system is activated when more widespread surveillance is needed during a rapid public health response. An emergency surveillance site or sites are activated for a minimum of 60 days to monitor a pathogen's spread across communities, allowing public health to respond to potential outbreaks.

During Spring 2024, in response to public feedback and the need to optimize resource allocation, the Colorado Wastewater Surveillance Program launched a data-driven mixed-methods evaluation. The effort aimed to optimize the sentinel network by assessing spatial coverage, population demographics, and the correlation of viral concentrations across pathogens between sentinel and nonsentinel wastewater sites, ultimately determining if additional utilities should be added to the sentinel model. The analysis was based on local public interest and spatial gaps that existed in the original sentinel model. An ANOVA was used to identify significant relationships for recent SARS-CoV-2, influenza, RSV, and EV-D68 wastewater surveillance data. A geographic information system (GIS) was leveraged to overlay census-tract population demographic data and healthcare facility locations with sewershed boundaries, providing a visual assessment of population representativeness and surveillance gaps. Key demographic variables were further characterized using descriptive statistics. The results of this evaluation successfully informed the decision to add a new utility to the Colorado Wastewater Surveillance sentinel site model, thereby improving overall network coverage. Colorado has committed to upholding this standard of continuous quality improvement by conducting a similar, comprehensive network evaluation on an annual basis.

Methodology

1. Conducted a retrospective comparison of the statewide surveillance system to four sentinel models using SARS-CoV-2 wastewater surveillance data.
2. Compared demographic characteristics and social determinants of health of populations served by the proposed sentinel models against both the statewide model (all previously participating utilities) and the general statewide population, while also comparing the SARS-CoV-2 viral concentration over time in the wastewater from these corresponding sewersheds.
3. Compared the seven-day rolling average of PCR concentration in nonsentinel sites to the sentinel site within each region using Spearman's rank-order correlation tests.

Note

This is a model for Colorado and it may not translate to other states or regions. A sentinel wastewater surveillance system should be dynamic and continuously reevaluated to ensure the system is equitable and informative for public health action.

Section 4: Activities

These activities are designed to help you formulate a right-sizing plan for your program. They'll prompt your WWS team to consider the factors that influence how you can best adapt your network and resources.

We anticipate this process will raise questions. Please submit any questions using this form by the close of business on Wednesday, Jan. 7, 2026. If you cannot use Google products, email questions to cdphe_dcphr_nwss_coe@state.co.us. We will compile all questions and address as many as possible during the webinar on Jan. 14, 2026.

After the webinar, additional resources will be shared to help you select the best sample-collection sites for your right-sized program.

Right-sizing is not about finding a perfect plan on your first try - there are simply too many changing factors for that. Instead, think of it as an iterative process.

Your first version will not be your last or your best, but with each revision, you'll refine your approach and move closer to the right fit for your program.

On the pages that follow, all fields highlighted in yellow are fillable using Adobe Acrobat.

Activity 1: Initial considerations

These exercises will help your team start thinking about the right-sizing process. As you move through later activities, you'll gain more clarity on how to move forward. If you're uncertain about certain terms or concepts, it's fine to skip them now and return later.

Instructions: Read the information below, then answer the questions.

CDC right-sizing guidance

In June 2024, the Centers for Disease Control and Prevention (CDC) National Wastewater Surveillance System released guidance on how to "right-size" wastewater surveillance programs. The guidance recommends maintaining one wastewater utility per 200,000–400,000 people.

Utilities should:

- **Be geographically distributed**
  - **Represent priority populations**
  - **Remain flexible enough to expand rapidly in response to emerging threats**

For example, in Colorado, this guidance suggests maintaining **15–30 utilities** in the surveillance network based on the state's population.

Questions

1. How many wastewater utilities are currently included in your program?
2. What is your statewide or jurisdictional population?
3. Based on CDC guidance, what range of utilities is recommended for your jurisdiction's population? (Lower range = population ÷ 200,000; Upper range = population ÷ 400,000.) _____ to _____
4. Will you be increasing or decreasing the number of utilities in your program?

☐ Increasing ☐ Decreasing ☐ Neither

Purpose

Having a clear purpose is critical to making key decisions during the right-sizing process. When your WWS system was developed, it likely served multiple purposes. Reflect on those original goals and use that perspective to answer the following questions:

What were the initial purposes of your WWS system?

Examples:
Monitoring for routine respiratory viruses
Monitoring for emerging targets
Monitoring for diseases specific to our region (ex: West Nile virus, Candida auris, Hepatitis

Consider the purposes you listed above. Are they serving your program well? Over time, you may have learned more about WWS or your community's needs, which could shift your focus.

What would you like your purpose to be after implementing a right-sized model?

Which stakeholders will you engage in your right-sizing discussions?

Examples:
Local health department personnel, Wastewater utility representatives, Wastewater utility regulatory agency, Tribal communities, Members of the public, Academic partners, Health department leadership, Communications team, etc.

Deadline

Keep in mind the process of right-sizing your program is **iterative**. Once you have implemented your first version, you should monitor it's effectiveness and make changes as necessary to improve.

Setting a deadline helps hold your team accountable, even if one isn't externally imposed. When choosing a timeline, consider:

- The CDC has requested all WWS programs establish a right-sizing plan as soon as possible.
- Are you facing a known funding deadline (e.g., grant expiration)?
- Future public-health funding is uncertain; many states have already seen reductions.

- Having a right-sizing plan in place demonstrates proactive management and readiness for budget changes.

What is your target deadline for completing your right-sizing plan?

Identifying risks

Right-sizing to conserve resources can create trade-offs. For instance, reducing the number of sampling sites may lower costs, but could limit the program's ability to detect emerging disease threats and monitor trends. Balancing efficiency and representativeness is essential to maintaining the value and credibility of your WWS program.

What are the risks involved in right-sizing your program? How can you minimize them?
Examples:

- *Decreased population coverage → select sites strategically to ensure representativeness.*
- *Negative public feedback → prepare communication materials and share evidence of adequate coverage.*

What are the risks of not right-sizing your program? How can you minimize them?

Examples:

- *Loss of control if another body imposes a right-sizing approach that doesn't fit your goals. Act early to define your own plan.*

Activity 2: Identifying data sources and tools

Introduction to data sources & tools

Access to high-quality data is critical to successfully right-sizing your program. You need a complete picture of the population you serve and the wastewater conditions in your area to make informed decisions about consolidating or expanding your resources.

While you likely reviewed many of these data sources when your program began, it's important to revisit them now to ensure you're working with the most current and relevant information. You'll also need analytical and visualization tools to help synthesize and communicate your findings.

Instructions: The table below lists the data sources Colorado used in its right-sizing efforts.

Use the **"Your data source"** column to document the data available to your program. Pay special attention to measures where supporting data are currently lacking.

Whenever possible, conduct analyses at the **sewershed level**. If data are unavailable at that level, use granular data from **census tracts**, **ZIP Code Tabulation Areas (ZCTAs)**, or **county-level** datasets as appropriate.

Blank rows are included at the end of the table for additional factors relevant to your WWS program.

The Colorado program uses a utility metadata survey that is distributed to utilities when they are first activated. This survey provides sewer-shed-level estimates of the populations served and includes demographic information.

You can download the national metadata survey template (.docx) and its accompanying data dictionary (.xls) your reference and use.

Data sources

Type of	Measure	Example data source	Your data source
Historic WWS data	Viral concentration data	Colorado WWS dashboards	Your internal dashboards or other internal reports
Utility data	Utility metadata	Wastewater utilities	
Spatial data	Healthcare facility point locations	Hospital location shapefiles	
Demographics		Utility metadata report	
	Age	Census	
	Race	Census	
	Ethnicity	Census	
Vulnerability	Population aged <5 or > 64	ACS	
	Limited English speaking households	ACS	
	Unemployment	ACS	
	Less than high school education	ACS	
	Area deprivation index	Neighborhood Atlas	
	Social vulnerability index	ACS	
	Environmental justice index	CDC	
Geographic	Urban/rural	Census	
	Rural-urban commuting area codes	USDA Economic Research	
	Rural-urban continuum codes	USDA Economic Research	

	Urban metro	CDC	
Healthcare Access	Distance to nearest health care facility	ACS	
	Insurance status		
Special populations	Students	State or school records	
	Tourists	Variable sources	
	Seasonal workers	Variable sources	
Pathogen-specific considerations	Vector abundance	Vector habitat maps	
	Vaccination coverage	State or local health department records	

Shapefiles

Tool name	Use	Link/more information
WWTP shapefiles	Used to display sewershed boundaries	Collected from utility partners
Census tract boundary shapefiles	Used to display various health and demographic metrics by census tract	https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html
Public transportation/ highway shapefiles	Used to show areas of population flux	https://www.bts.gov/ntad https://www.bts.gov/maps
County boundary shapefiles	Used Colorado to display county boundaries within Colorado response regions	https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.html
Healthcare facility shapefiles	Used to display the point location of healthcare facilities	Downloaded from Colorado's open portal data
Syndromic site shapefiles	Used to display the point location of syndromic surveillance sites	Received from internal SME programs

Data tools

You will also need tools to compile, analyze, and visualize your data. Below are some examples used by Colorado during its right-sizing process.

Tool name	Use	Link / more information
ArcGIS/QGIS	Mapping spatial data (sewershed boundaries, transportation lines, population density, healthcare sites)	ArcGIS, QGIS
Microsoft Excel	Data storage and visualization	
Microsoft Word	Report writing	
Google Sheets	Data storage, sharing, and visualization	
Google Docs	Report collaboration and drafting	
Tableau	Data visualization	Tableau
RStudio	Data analysis and visualization	RStudio Desktop

Activity 3: Goal setting

Introduction to goals for right-sizing

Setting clear goals is essential to determining which sample collection sites will generate the most valuable data for your right-sized program. Goals are **broad, strategic outcomes** that typically require completing several smaller tasks to achieve.

In this section, focus on your *goals* rather than the individual steps needed to accomplish them. The next activity will guide you in breaking down those goals into actionable tasks.

Key Concept

Goals vs. Tasks

GOALS

Big picture outcomes that require completing multiple similar actions. Should be simple enough for non-experts to understand

Example:

Make a peanut butter and jelly sandwich

VS

TASKS

Specific, detailed actions that contribute to achieving a goal. May include technical details and can typically be completed in a shorter time frame.

Example:

Gather ingredients (bread, peanut butter, and jelly), spread peanut butter on one slice of bread and jelly on the other, combine slices to make the sandwich.

Instructions: Read the examples of right-sizing goals below, which include specific details that make each one a **SMART** (specific, measurable, achievable, relevant, and time-bound) goal. Then, complete the "Goals Activity" table on the next page to define goals for your WWS program.

Example Goals for right-sizing

- **Goal 1: Reduce program operating costs**
  Reduce operating costs by 50% by decreasing the number of sample collection sites by August 1, 2026.

- **Goal 2: Maintain data quality with fewer sites**
  By March 1, 2026, review all existing WWS data to identify overlapping data between nearby sites.

- **Goal 3: Ensure coverage for socially vulnerable populations** *Use Social Determinants of Health data and vaccination coverage data to rank all current sites by their service to underrepresented communities by March 20, 2026.*

The SMART Goal Framework is a widely known, easy to use method for ensuring you are setting high quality goals. While using SMART Goals isn't required, it is a reliable way to make sure that your goals are clear, realistic, and well-defined. SMART Goals are:

Identify your goals

Instructions: Meet with your team to define the specific goals for your WWS program. You may use the **SMART Goals** framework to create strong goals, but it is not required. Use the table below to outline your goals. Once you have entered them, use the priority column to rank them in order from most to least important (most important = 1)

Interactive Activity

There is an interactive activity available for this exercise. Access it here.

Directions for using the interactive activities can be found here.

Goal	How Will You Measure Success	Deadline	Priority

Activity 4: Tasks

Introduction to tasks

In Activity 3, you established SMART goals for your right-sizing project. The next step is to create a list of tasks that will need to be completed to achieve those goals.

Identifying your tasks

Instructions: Use the space below to list out the tasks you need to complete for your right-sizing project.

Examples:

1. *Complete a comprehensive clinical data inventory and summarize three key data sources.*
2. *Gather and organize wastewater surveillance data for all currently monitored pathogens.*
3. *Compile shapefiles for all participating utilities.*
4. *Download and organize all data sources identified in Activity 3.*
5. *Create a comprehensive list of current sample collection sites.*
6. *Rank each site based on how well it supports your program goals.*
7. *Define and test several sentinel model options to determine which best aligns with your objectives.*

Prioritizing tasks

Use the bullseye diagram on the next page to discuss and rank all tasks from Activity 4 based on priority, considering the purpose of your WWS system and your staffing capacity.

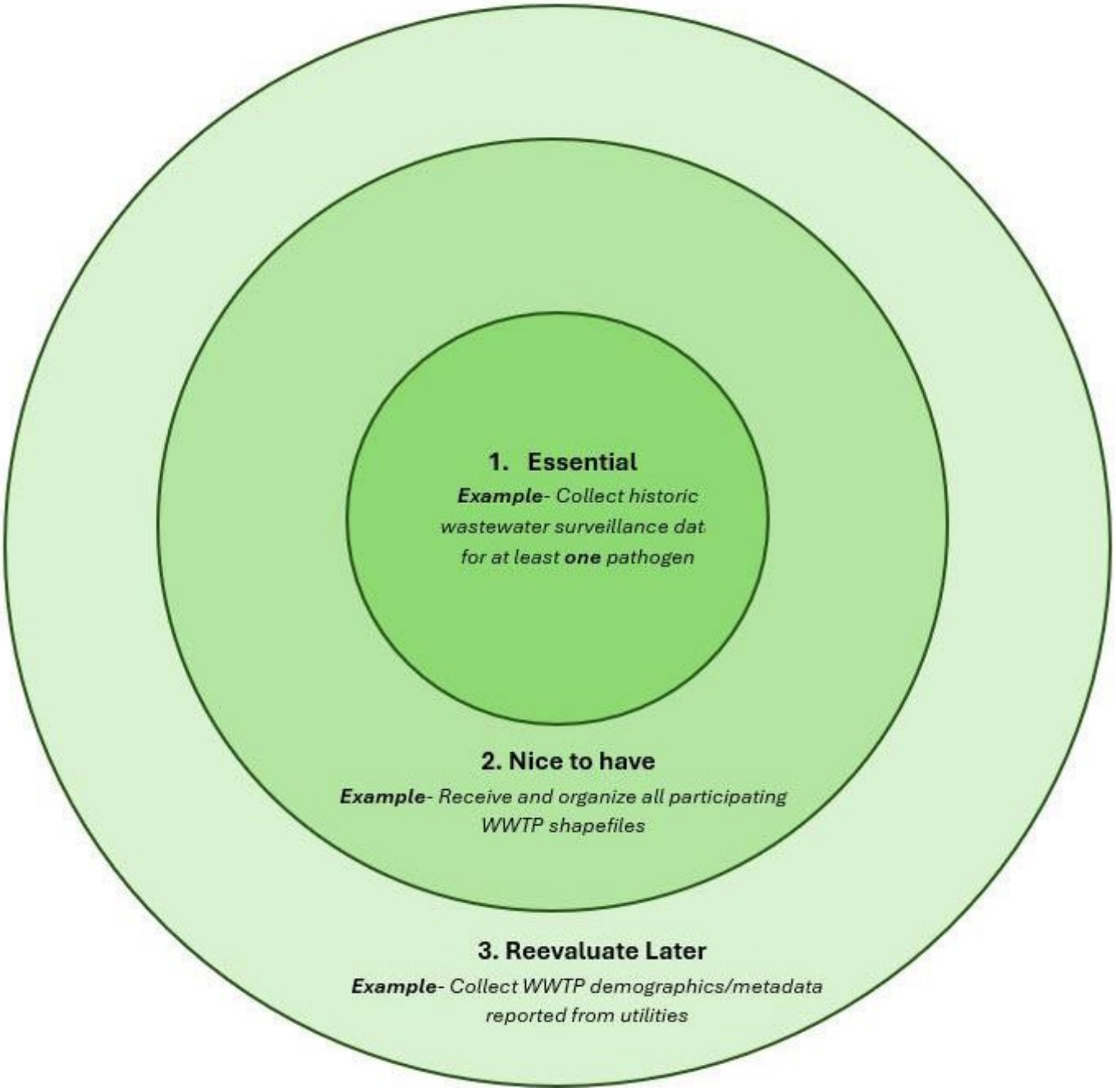
Key terms:

- **Essential:** Tasks and considerations required for the WWS program to function and for you to meet your right-sizing goals.
- **Nice to have:** Non-essential items that can be included if resources allow.
- **Reevaluate later:** Tasks or ideas not currently feasible due to time, budget, or staffing capacity.

Interactive Activity

There is an interactive activity available for this exercise. Access it here.

Directions for using the interactive activities can be found here.



Assigning tasks

Key roles

Each team member contributes unique expertise to the sentinel evaluation process. Below is a list of the roles that were involved in right-sizing efforts for Colorado. **Your program may not have these specific positions,** but as you read through the descriptions, start thinking about who on your team may best fill these roles. You can assign more than one role to a person if your team is small.

Epidemiologist: Evaluates sentinel model approaches using utility metadata, social vulnerability variables, and viral concentration data. Conducts statistical tests and reassesses models annually to incorporate new data.

Team members who can fill this role: _____

Data analyst: Supports data integration, visualization, and dashboard development. Conducts analyses and refines model performance metrics.

Team members who can fill this role: _____

Coordinator: Manages communication with partners and stakeholders. Plans engagement events and updates MOUs for sentinel and emergency sites.

Team members who can fill this role: _____

Manager: Oversees evaluation progress. Shares proposals with leadership, NWSS, and partner jurisdictions to review findings and guide program direction. Presents plans to stakeholders during community engagement events and fields questions and concerns.

Team members who can fill this role: _____

Task assignments

Use the table below to assign responsibilities for each **essential task** identified in the Bullseye Diagram. An example in green, italicized text is included for your reference.

Task	Person Responsible	How will success be measured?	Deadline for Completion
Collect historic wastewater surveillance data for at least ONE pathogen	*Epidemiologist*	*All data collected and synthesized into a single spreadsheet by deadline*	*12/01/2025*

Section 5: Next Steps

Next steps

After completing this workbook, follow the steps below to finalize and implement your right-sizing plan.

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1. Submit your questions

Share your team's questions about the right-sizing process by **Monday, Jan. 7, 2026**, using the online form or by emailing cdphe_dcphr_nwss_coe@state.co.us. These questions will help shape the discussion at the webinar.

2. Attend the webinar

Join the **Right-Sizing Your WWS Program Webinar** from **10–11:30 a.m. MST** on **Wednesday, Jan. 14, 2026**. National experts from Colorado, California, and Michigan will discuss lessons they've learned and answer participant questions.

3. Select your sample collection sites

After the webinar, use the additional workbook and tools provided to determine which sites best fit your right-sized program goals.

4. Submit your plan for internal approval

Present your right-sizing plan to your program leadership or funding administrators for review and feedback.

5. Implement your plan

Begin executing your right-sized wastewater surveillance plan. Continue to monitor performance and make iterative adjustments as needed to maintain data quality and efficiency.