



## Data Collection and Monitoring

*Supporting information for Section III.F.5 of the 1W1P Plan Content Requirements*

This document discusses considerations for local governments in designing and carrying out data collection and monitoring for the purposes of watershed management and assessing progress toward plan goals. It also provides information on water data collected by Minnesota's state agencies.

Good data and information are critical to effective watershed management. Managers need to know about the status of water bodies, what threatens them, and what strategies they can use to address those threats. They also need information on the effectiveness of management activities in order to adapt and improve. In the context of One Watershed, One Plan, data are useful in two main ways: 1) during planning for setting priorities and goals, and 2) after plan implementation as part of efforts to evaluate the effects of past restoration or protection work.

The *One Watershed, One Plan - Plan Content Requirements* require a description of: existing data collection efforts; adequacy of those efforts in demonstrating progress toward plan goals; and any additional data needed to meet watershed management goals, including filling data gaps.

Once you have drafted measurable goals and discussed implementation activities, think about the metrics/indicators you will use to measure progress. For which priorities and goals will showing success be most important? What data will you need to tell your success stories? Where in the watershed do you hope to make the biggest gains? Your data collection should focus on answering the question "are we making progress on our highest priorities?"

In developing this section of the plan, determine whether enough data is being collected to demonstrate progress. If not, what new data needs to be collected? If you decide not to plan for any new data collection efforts, your plan should simply describe the status quo.

### Definitions

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In this document, **data collection** refers broadly to activities that characterize water resources and/or populations (e.g. biological, physical, and chemical parameters; social measures). Some examples of data collection include:

- Inventorying unsealed wells
- Taking field measurements of stream stability
- Mapping and calculating percentage of land in the watershed that is in perennial vegetation
- Hosting focus groups to gauge landowner interest in installing controlled drainage

**Monitoring** is a special form of data collection that's ongoing and systematically measures the same parameters at set time intervals, often in a fixed location. For example:

- Taking water samples at fixed locations during rain events

- Sampling fish and macroinvertebrates (biological monitoring) in a designated stream reach every 10 years
- Administering the same survey at predetermined points in an education initiative

**Tracking** is counting implementation outputs (number of best management practices installed, acres of prairie restored, feet of shoreline stabilized). Some of your plan metrics may require tracking, which does not need to be addressed in this section of the plan. How you will track your outputs should be described in the administration and coordination section of the plan (III.G.5.a in the *One Watershed, One Plan – Plan Content Requirements*).

## Purposes for Collecting Data

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Identifying the purpose for collecting data will be one the first (if not **the** first) discussions for your planning partnership on this topic. There are three main categories of data collection, listed below. A particular data collection effort may fulfill one or more purpose. Please note that while much of the rest of this document focuses on data collection related to water quality and quantity, the same concepts apply when thinking about other types of data collection, including social measures.

**Documenting conditions:** determining baseline conditions; status, such as whether a water body meets established standards or a reference condition; or establishing trends. Note that establishing a trend requires a robust, long term data set.

*Examples:* MPCA’s intensive watershed monitoring program, continuous stream flow monitoring, statewide observation well network, fish contaminant monitoring, MDA’s township well testing program for nitrates, citizen stream and lake monitoring, Dr. Mae Davenport’s [community capacity assessments](#).

**Investigating problems:** collecting data in targeted locations to determine specific causes of impairments or other problems, to quantify inputs of pollution from various sources, or to calibrate models.

*Examples:* MPCA’s stressor identification work, groundwater chemistry to inform a county geologic atlas, surveys to understand why there is low engagement in a cost-share program.

**Determining effectiveness:** quantifying the outcomes of voluntary or regulatory management actions. This type of data collection is designed to evaluate and refine a particular management approach. Effectiveness monitoring can be done at the plot or field scale, or at a larger watershed scale.

*Examples:* (*field scale*) MDA’s Discovery Farms program; (*watershed scale*): pre and post surveys to evaluate a watershed-wise education initiative.

## Considerations for Using Existing Data

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Minnesota’s state water agencies – often in partnership with local or federal partners - collect, analyze, and synthesize data about groundwater and surface water quantity and quality across the state. Local governments may have separate efforts that also collect data periodically or have ongoing monitoring programs. To decide if existing state and local efforts are sufficient to meet and measure watershed management goals, consider the following questions:

- What kind of data is currently being collected? Who is collecting it? Where? How often?
- Why is *that* stream being monitored at *that* location (purpose)? What are the data going to tell us? How is it connected to our goals?
- Is the current level of effort – especially with regard to scale in space and time - adequate for watershed management and goal evaluation purposes?
- Does the scale of existing data collection align with the scale of our plan goals?

## Scale

Your ability to leverage existing local or state data collection and monitoring efforts will depend on how well the scale of monitoring aligns with the scale of your plan’s goals. For example, if local data collection efforts are currently set up at the HUC-12 or subwatershed scale, but you’ve included watershed-wide goals in your plan, how will you scale up your data to assess progress towards these goals? Alternatively, if state-level efforts are conducted at the HUC-8 scale, but your plan includes goals for specific subwatersheds, will you be able to make use of the state data or will additional local effort at a smaller scale be required?

Another important aspect of scale is time. If the plan outlines a particular outcome in a particular timeframe, do existing data collection efforts align well enough with that timeline to be able to show progress? Are you collecting data frequently enough to say anything about trends?

## State-Level Monitoring

The State has invested heavily in monitoring networks (see Table 1) and reporting frameworks (e.g. Clean Water Road Map, Clean Water Fund Performance Report) to measure progress at the sub-watershed, watershed and/or basin scale over time. While each statewide program has a specific purpose and design, the data may be very useful in local planning and in evaluating progress toward your plan goals during implementation. The planning process is also an opportunity to discuss coordination between state and local governments to maximize the return on our collective monitoring investments.

A detailed inventory spreadsheet, summarized in Table 1 and available from your BWSR or MPCA contact, includes a detailed description, parameters, scale, waterbody type, and contact information for each program. This tool is a good starting point – directly contacting agency program leads is the best way to get details.

**Table 1.** Summary of ongoing state-level water quality & quantity monitoring programs. RS = rivers & streams, L = lakes, W = wetlands, and GW = groundwater. See the associated spreadsheet for details about each program.

	MPCA	MN DNR	MDH	MDA
<b>Nutrients</b>	RS, L, W	RS, L		RS, GW
<b>Suspended solids</b>	RS, L, W	RS		RS
<b>Productivity</b>	RS, L	RS		
<b>Pesticides</b>				RS, L, W, GW
<b>Bacteria</b>	RS, L		GW	
<b>Biology</b>	RS, L, W	RS, L		
<b>Water level/flow</b>	RS, L	RS, L		GW
<b>Algal toxins</b>	L			

	MPCA	MN DNR	MDH	MDA
<b>Invasive species</b>		RS		
<b>Fish contaminants</b>	RS			
<b>Chloride</b>	RS, L, W	RS	RS, L, GW	RS
<b>Sulfate</b>	RS, L, W	RS, L	RS, L, GW	

## Considerations for Collecting New Data

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After identifying your purpose for data collection and thoroughly examining existing current state and local efforts, you may find that the available information is inadequate for evaluating progress toward plan goals or answering key watershed management questions. This may be because current efforts don't measure the parameter, location, and/or scale you're interested in. If you have determined that the only way to achieve your purpose is through collecting new data, you will need to describe these additional efforts in your watershed plan.

For new data collection efforts, your plan should demonstrate that you've thought through these questions:

- What additional data do we need, and where do we need it?
- Who will collect the data, and with what methods?
- How much will it cost? How will we pay for it?
- How much additional effort do we need? (e.g., is a continuous monitoring station the only way to get what you need?)
- Do we have staff with the proper training and knowledge to run the equipment and analyze the results?
- Where will we store our equipment when it's not in use? What is our replacement budget if someone steals a solar panel or the equipment breaks?
- Is our computer system set up to maintain that data? Do we want our data to be uploaded into a statewide database? If so, how will we conduct quality assurance and quality control?

State agencies have monitoring experts on staff who may be able to help your group think through these questions. Refer to the interagency monitoring inventory spreadsheet to find experts for the parameters you are interested in.

### Cost Constraints

Cost considerations will have a substantial role in determining what data your partnership can collect. The data collection and monitoring section of your plan must be realistic; if it cannot be implemented due to cost constraints, you will need to re-think alternate approaches or surrogates. You might also consider using literature values from studies done in similar environments under similar conditions to estimate the impact of your management activities. Your planning partnership should demonstrate a commitment to finding money or collaborators to implement needed data collection efforts or develop adequate alternatives that provide an equivalent evaluation of progress.

## Models and Tools

Collecting field data is expensive - investing in extensive local data collection to evaluate progress toward plan goals may not be feasible or an appropriate use of funding. When it comes to evaluating progress toward plan goals, models and tools can be a surrogate for data collection, provided 1) there is adequate “tracking” of implementation work (e.g., number, characteristics, and location of management practices installed); 2) there is enough empirical data to calibrate the model; and 3) the model is designed to answer the question at hand.

One activity in the data collection and monitoring section of your plan may be to fill data gaps in order to refine or better calibrate a model.

## Scale

You will be better able to demonstrate progress towards plan goals if the scale of your data collection efforts matches the scale of your implementation efforts. Consider the graphic to the right.

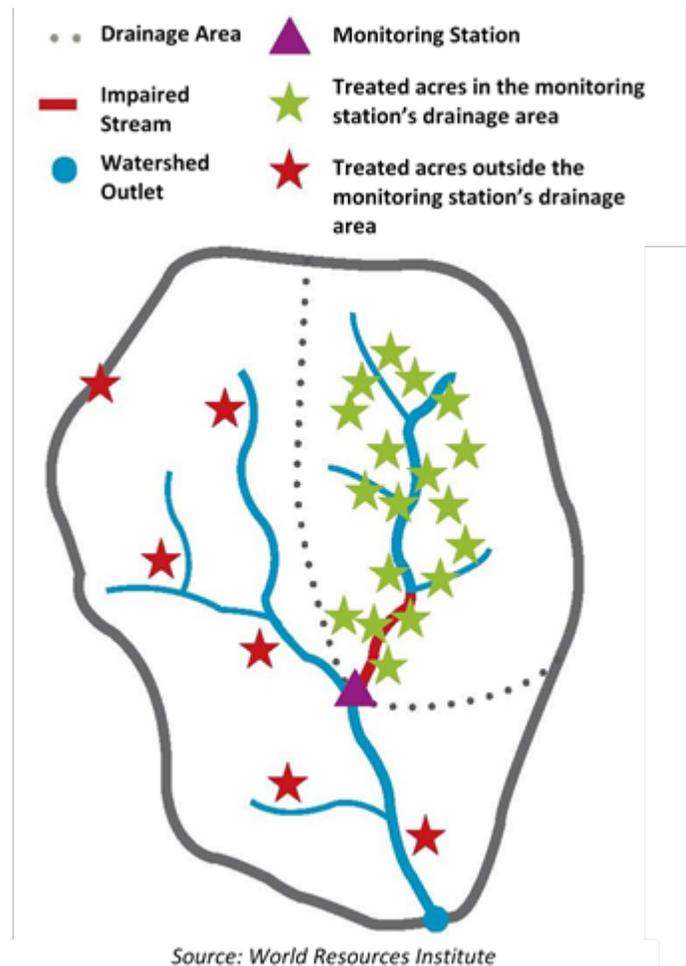
Implementation efforts are targeted upstream of the impaired stream, and the monitoring station is located at the outlet of the impaired stream. If practices had been dispersed across the watershed, or if the monitoring station had been located further downstream (in the mainstem of the river), it may have been impossible to demonstrate measurable progress.

## Level of Effort

It may be appropriate to focus data collection efforts on practices with lesser-known outcomes rather than investigating practices with a high level of reliability and proven outcomes. BWSR suggests investing in the minimum amount of effort needed to reasonably assess progress toward key plan goals. This means the level of effort/intensity could vary significantly across the state for a particular type of goal or parameter, and it could vary across goals within a plan.

## Communicating Results

Data collection will produce results that you will use to communicate measurable progress to the public, potential funders, and decision-makers at the local, state, and federal level. Determining how you will disseminate these results is a good thing to think about as you develop the data collection and monitoring section of your plan.



## Getting to a Quality Plan

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The data collection and monitoring section of your comprehensive watershed management plan should include a diverse set of activities that are directly tied to watershed goals. Data collection efforts will include all actions necessary to evaluate progress towards all types of plan goals, from water quality to community engagement. The plan will be thorough and realistic, describing when you can leverage existing data collection efforts and when you will use modeling or surrogate measures in place of on-the-ground data collection. Data collection and monitoring efforts will guide local watershed management, and you will ultimately use the results to report improvements to the public, key stakeholders, and funders.