

**NATURAL RESOURCES CONSERVATION SERVICE  
INTERIM CONSERVATION PRACTICE STANDARD  
MONITORING AND EVALUATION**

(No.)

CODE 799

**DEFINITION**

Monitoring and evaluation are the actions and activities, using acceptable tools and protocols, to measure the effectiveness of conservation practices and systems, and/or to provide data for model development, verification, and validation for use of results in non-monitored fields.

**PURPOSES**

- Provide site specific field data for input into models to predict practice/system performance.
- Sample and measure practice performance to treat soil, water, air, plant, animal, and energy resources.
- Collect and evaluate data for adaptive management to treat the soil, water, air, plant, animal, and energy resources.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to all land uses where conservation practices have been applied, and there is a need to determine the effects and performance on the planned resource concerns. This practice is not intended to be used beyond the farm boundary.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Elements to be monitored shall be appropriate indicators of the resource(s) to be evaluated.

Data collection methods shall be commensurate with established scientific protocols.

Timing and frequency of data collection shall be consistent to ensure accurate results, and shall be determined based on the requirements of the models in which the data will be used.

Monitoring data shall be collected for an appropriate period based on the resource concern being monitored and evaluated. This will generally be a minimum of 3 years, but could be as short as one year for simple evaluations such as monitoring annual vegetative cover.

Data shall be collected to adequately address each of the following 4 monitoring components:

1. **Baseline Monitoring** – Sufficient data shall be collected to establish the pre-installation condition. Units of measure and monitoring protocols shall be consistent between all monitoring components and the resource concern being monitored.
2. **Implementation Monitoring** – Sufficient data shall be collected to determine whether the conservation practice/system was installed and maintained according to applicable standards and specifications.
3. **Effectiveness Monitoring** – Sufficient data shall be collected to determine whether the action achieved or did not achieve the desired result(s) over the expected range of conditions and resource concern being evaluated.
4. **Validation Monitoring** – Sufficient and appropriate data shall be collected to determine whether assumptions and models used in decision making were

correct.

Analysis of the data and interpretation of the results shall comply with standard guidelines and best protocols of the scientific method.

The soil, atmospheric, water, plants, fish and wildlife, and cultural/human consideration data collected and analyzed will be within the farm boundary where the practice is applied or the edge of the field.

#### **Additional Criteria to Provide Site Specific Field Data for Input into Models to Predict Practice/System Performance**

The data collected shall match appropriate data that the model needs to perform its intended purpose. For example, soil nutrient concentrations, time, rate, method of application, and source of nutrient applications, crop rotation, and tillage operations to monitor and evaluate nutrients in ground or surface water.

#### **Additional Criteria to Sample and Measure Performance and Practice Effectiveness on Resource Concerns**

The monitoring and evaluation activities shall specify the resource concerns being evaluated and follow accepted procedures in NRCS handbooks, technical notes, manuals, or other accepted science-based procedures; e.g., if the goal were to measure crop residue amounts, then the accepted procedure would be found in the National Agronomy Manual, Part 503E.

#### **Additional Criteria to Collect and Evaluate Data for Adaptive Management**

The plan must describe the data elements, appropriate units of measure, and/or observations that need to be made to determine the practice effectiveness. In addition, the plan must allow for input from the land user, such as their observations, comments, and recommendations for improvements.

The monitoring and evaluation can be as simple as measuring crop residue after various tillage or harvest operations, or as complex as the installation and operation of water quality sampling equipment at the edge of the field.

It is recommended to partner with other agencies, NGO's, universities, etc., when monitoring the more complex processes (e.g., water quality at the edge-of-field.)

Monitoring and evaluation are most effective when results can be compared to a baseline (existing or pre-treatment conditions).

It is advisable to involve the producer as much as possible in the data collection phase. This will facilitate evaluation of the data in the Conservation Planning Process.

Increasing the monitoring/evaluation can improve the accuracy of the data and analysis to make better informed decisions.

### **PLANS AND SPECIFICATIONS**

Plans and specifications shall be prepared in accordance with the criteria of this standard.

As a minimum, the plans and specifications shall provide the following:

1. Description and documentation of the baseline conditions.
2. Description of the parameters to be monitored and/or evaluated and how these elements relate to specific resource concern(s).
3. The methods to be used to collect the monitoring and evaluation data.
4. The time and sampling frequency of the data collection.
5. The electronic format to store and analyze the data collected.
6. Qualifications, responsibilities and timelines for the producer, vendor, and NRCS to conduct monitoring and evaluation activities.
7. Land owner permission to use and/or share the data collected for monitoring and evaluation.

### **CONSIDERATIONS**

**NRCS, State**

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8. When needed, permission from the land owner to install monitoring equipment and access to the monitoring equipment
9. Summary of the data needs for the calibration and validation of the models in which the data will be used.

For adaptive management, the plan must describe the data elements, appropriate units of measure, and/or observations that need to be made to determine the practice effectiveness. The plan must also provide a mechanism for refining monitoring and evaluation protocols based on findings from adaptive management. In addition, the plan must allow for input from the land user, such as their observations, comments, and recommendations for improvements.

### **OPERATION AND MAINTENANCE**

Prepare annual and final reports of the monitoring and evaluation in the format defined in the specifications for NRCS and the land owner.

Final reports should be reviewed by appropriate subject matter expert(s) at the NRCS state office.

Auditing of the reports – NRCS and the land owner will annually review the monitoring and evaluation process and products to ensure the intended purpose(s) are being achieved.

Annual and Final Reports to be shared with NRCS and the land owner include:

1. Annual and final reports prepared by the monitoring entity.
2. Hard copy (and electronic copy for NRCS) of data collected, including statistical analyses, trend graphs, and descriptions of data gaps and data quality.
3. Annual conference between NRCS, the land owner, outside agencies needing or requiring monitoring and evaluation reports, and monitoring entity to evaluate on-going progress to determine any immediate adaptations which should be applied.
4. Summarize the annual and final report to determine practice effectiveness on the resource(s) of concern and potential adaptations in the practice(s).

### **REFERENCES**

USDA – NRCS. National Planning Procedures Handbook (NPPH)  
<http://directives.sc.egov.usda.gov/RollupViewer.aspx?hid=17088>

USDA – NRCS. 1996. National Handbook of Water Quality Monitoring, Part 600, National Water Quality Handbook.

USDA – NRCS. 2002. Analysis of water quality monitoring data (draft). Part 615, National Water Quality Handbook.

Other handbooks and manuals available at  
<http://directives.sc.egov.usda.gov/>:

National Biology Handbook

National Range and Pasture Handbook

National Engineering Handbook

National Water Quality Handbook 2003 Parts 614 and 615

National Agronomy Manual

National Biology Manual

National Forestry Manual

National Plant Materials Manual

National Engineering Manual