Monitoring and Evaluation
Edge-of-Field Monitoring for Adaptive Management

Indiana Job Sheet - 799 ***December 2010***

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.

Purpose

- Collect and evaluate data for adaptive management to treat the soil, water, air, plant, animal, and energy resources.

This practice will measure the relative benefits of conservation activities to allow producers and planners to evaluate what their conservation efforts have done for the quality of water leaving their farms, and where there may be other areas that need addressed.

Criteria - General

The Indiana Water Monitoring Council provided NRCS with recommended sampling and analysis protocols that provide the level of detail needed to meet the above purpose, and that are consistent with other monitoring efforts occurring in Indiana.

Each possible sampling site does not need sampled. However, it is encouraged to collect samples at as many identified locations as feasible. Safety and access will be considered when choosing sampling sites. Also, factors that are beyond the control of the producer (such as drainage tile that enters the field from neighboring properties) may also limit the use of the data.

Criteria – Drainage Tile Outlets

Frequency: Drainage tile outlets will be sampled once per week when flowing. **If tile are under water from storm events, a sample will be collected in-stream at a safe location (such as a bridge).** If needed for safety or ease of collection, a water control structure may be installed to provide access to the existing drainage tile. This structure will also provide the additional opportunity to control tile water in the future as applicable. Reference the Structure for Water Control (587) standard for additional information.

Rainfall data will be collected by participating in and following the protocols of NOAA's Community Collaborative Rain, Hail, and Snow Network http://www.cocorahs.org/.

Nitrate will be collected using a procedure that meets the following criteria per the manufacturer's instructions:

- Test Strips that provide a measurement range between 0 – 50 parts per million (ppm) with minimum measurement increments of:
  - 0, 0.5-1.0, 2, 5, 10, 20, and 50 ppm as N

Phosphorus (as Orthophosphate) will be collected using a procedure that meets the following criteria per the manufacturer's instructions:

- A test kit that provides a measurement range between 0 – 10 ppm with minimum measurement increments of:
  - 0, 0.1, 0.2, 0.3, 0.4, 0.6, 0.8, 1.0, 2, 3, 4, 5, 6, 8, and 10 ppm

Turbidity will be collected using a 60 cm Transparency Tube following the manufacturer's instructions.

Flow (Tile Outlets) will be collected using a volumetric method using a wide-mouthed container of

known volume and a stopwatch. By recording the time it takes the container to fill up, flow can be estimated (i.e. – gallons/second).

Criteria – Surface Runoff Sites

The sampling methods for surface runoff sites will follow the same protocols as those for Drainage Tile for Rainfall, Nitrate, Orthophosphate, and Turbidity.

Frequency: Surface runoff sites will be sampled within 1 day of each runoff/storm event. Surface runoff sites will be selected where existing collection points exist, such as a structure at the bottom of a waterway or a concentrated flow area. A "diverter/splitter" will be installed if needed to direct surface runoff water into a collection container for analysis.

Criteria – In-Stream Sites

In-Stream sites will be sampled at the same locations as the selected tile and/or surface runoff sites using the same procedures and frequencies. **If safety is an issue, a sample will be collected in-stream at a safe location (such as a bridge).**

Flow (In-Stream) will be documented using a relative estimate of whether the flow is "none", "below base flow", "base flow", "¼ - ½ bank full", "½ - ¾ bank full", "¾ bank full to bank full", "bank full" or "out of bank".

RECORD KEEPING

Record keeping of the management activities that occurred on the field are required for helping analyze the results of the monitoring. A sample data collection sheet of the water monitoring data is on the following page, but additional records such as Nutrient management activities will also be used for data analysis.

ADDITIONAL ANALYSES

This practice may be used with other monitoring efforts such as "Nutrient management Adaptive Management".

SAFETY

Water monitoring will need to occur during all weather events. Safety will always be top priority and monitoring will not occur when sampling locations are dangerous to access. However, every possible effort should be made to sample the receiving streams at bridges or other safer access points.

USES OF THE DATA

Monitoring results will be used by the producer and the conservation planner to assess the relative/comparative site-specific benefits of the installed conservation. By reviewing the monitoring results within and between fields, site-specific changes to future conservation activities will be clearer based on different management systems used (tillage, rotations, Nutrient management, etc.); soils; topography; presence or magnitude of drainage (sub-surface drainage, tile risers, etc.); off-site impacts such as neighboring properties; etc.

DATA SHARING

The collected data will not be shared outside of NRCS and is protected by Section 1619 of the Farm Bill.

PAYMENTS

Payments will be 'flat-rate' type, and will take into account the typical scenario for equipment (turbidity tube, sample bottles, analysis kits); materials (reagents); time (collecting samples, recording data, record keeping); sample analyses; etc.

Payments will be made on a per-sample basis, and will occur as one annual payment for all samples at each site.

Payments for sampling the same locations over a 3-year period are eligible and recommended to assess site-specific results under different management regimes (tillage, rotations, Nutrient management, etc.) and weather patterns.

Water monitoring analyses and applicable nutrient and crop management records will be collected for a 1-year period and provided to NRCS prior to payment. NRCS will assist in interpreting the results for further management considerations.

OTHER CONSIDERATIONS

The more sites sampled, the better the comparative results. Also, if there are some locations with varying levels of conservation applied, differences may be more readily seen. Likewise, locations with varying site conditions (soils, topography, etc.) may also show significant difference.

Although not required, sampling multiple years at the same locations will be beneficial to accommodate for the variety of weather patterns and crops grown on the same fields over time.

Monitoring and Evaluation - Specification Sheet

Landowner **Tract Number** **Field Number**

Sample Data Collection *Example* for a Tile Outlet Site:

Week	Date	N	P	Turbidity	Rainfall	Flow[1/] (sec)	N-Fert (lb)	P-Fert (lb)	Tillage	Plant	Notes
1	01-May-11						50	25			pre-plant fert
	03-May-11	0.5	0.1	1	0.5	5					
2	09-May-11										
	11-May-11	1	0.1	1	1.0	3			No Till	corn	no-till planted corn
3	16-May-11	0.5	0.4	3	0.25	2					
4	24-May-11	2			0	3					
5	31-May-11	1	0.2	2	0	5					
	03-Jun-11						100				Side-dress N

[1/] Measured in Seconds

Drainage Tile Outlet Sample Sites Information

Site #	Outlet Diameter	Drainage Area	Crop Rotation	Tillage / Mgmt Methods	Installed Conservation Practices	Planned Conservation Practices	Notes
1							
2							
3							
4							
5							
6							

Surface Runoff Sample Sites Information

Site #	Drainage Area	Crop Rotation	Tillage / Mgmt Methods	Installed Conservation Practices	Planned Conservation Practices	Notes
1						
2						
3						
4						

In-Stream Sample Sites Information

Site #	Bank Top Width	Base Flow Width	Depth From Top Bank to Base Flow	Depth From Top Bank to Stream Bed	Bank Slopes	Notes
1						
2						

Typical Stream Cross Section: