Conservation Evaluation and Monitoring Activity

Edge-of-Field Water Quality Monitoring - System Installation

CEMA 202

Definition

This activity:

1) Establishes criteria for the installation of a water quality monitoring system that collects data for evaluating conservation practice effectiveness of field scale model validation for on-farm adaptive management.
2) Is normally used in conjunction with Edge-of-Field Water Quality Monitoring - Data Collection and Evaluation (CEMA 201). However, after receiving approval from the NRCS National Water Quality Specialist, it may be used independently from CEMA 201.
3) Measures pollutants at the edge-of-field that are tied to a water quality constituent of concern for the associated receiving stream or water body.

Applicable Land Uses

This conservation activity applies to all land uses where conservation practices are or will be addressing surface and subsurface drainage water quality, and there is a need to determine the effects and performance of applied conservation practices. The pollutant(s) to be measured at the edge-of-field must be tied to a water quality constituent of concern for the associated receiving stream or water body. This ties the activity to addressing a resource concern using the NRCS conservation planning process and promotes a systems approach to conservation.

REQUIREMENTS

Qualified Individual Requirements

The Natural Resources Conservation Service (NRCS) strongly encourages participants to know the following Qualified Individual (QI) Requirements to ensure the person they hire is a good match for their needs and objectives.

A QI for this CEMA meets <u>all</u> of the qualifications listed below:

1) Can demonstrate successful installation of at least two Edge-of-Field water quality monitoring projects that use(d) flow measurement, precipitation measurement, and automated water quality sampling devices including planning, design, installation/layout, inspection, operation and maintenance of the monitoring system(s).
2) Has document prior system installation and is prepared to provide a copy of previous installation report, including photographs, with personally identifiable information redacted.
3) Non-qualified individuals are allowed to install of a water quality monitoring system under the guidance and oversight of a QI.

The NRCS National Water Quality and Quantity Team (NWQQT) will maintain a list of QIs for this activity. Prospective QIs may contact the NWQQT to be added to or removed from the list. NRCS staff may also contact the NWQQT to inquire about or provide information regarding QIs for their respective regions. Please contact karma.anderson@usda.gov.

General Requirements

1) This CEMA includes the performance of work and documentation of the tasks, results, interpretations, and other activities described herein by a QI.
2) Prior to initiation of the CEMA, the QI must arrange a pre-work conference to ensure all parties understand participant's objectives, required deliverables, and characteristics of the CEMA.
   a) The parties in the pre-work conference must include the participant, the QI, and the NRCS field office staff. The parties should agree whether they will join in-person or join via phone, web-meeting, etc.
   b) If the participant will employ a Technical Service Provider (TSP) to implement a Conservation Planning Activity (CPA) or Design and Implementation Activity (DIA) that will be supported by results of this CEMA, it is recommended to invite them to the pre-work conference too.
3) A QI may use any reference information, resource concerns, conservation practice standards and related documents served in the NRCS Field Office Technical Guide (FOTG) for the state where this CEMA is performed. The FOTG home page hyperlink is: https://efotg.sc.egov.usda.gov/#/

Technical Requirements

System Design

1) The system scenario outlined in Edge-of-Field Water Quality Monitoring – Data Collection and Evaluation (201) is considered the "typical system" designed to meet the stated purposes of edge-of-field water quality monitoring.
2) Event Mean Concentration (EMC) and accurate flow (discharge) measurements are required for each runoff event.
3) All systems must be capable of sampling runoff events throughout the year.
4) The typical system specifications listed in table 1 and described subsequently meet the requirements for two types of edge-of-field monitoring: surface runoff sites (figure 1), and sites with subsurface drainage (figure 2).

Table 1: Equipment and Quantity

EQUIPMENT	QUANTITY
Pre-calibrated flow control structure [a]	2
Depth (stage) sensor and cork gauge	2
Area velocity flow meter [b]	2
Rain gauge (1 tipping bucket and 1 standard) [c]	2 each
Automated sampler with bottles and tubing	2
Power source (solar panel, controller, and batteries)	2
Equipment shelter	2
Communications device (cell phone, radio) [d]	2
Enclosure with propane heat [e]	2
Miscellaneous (connectors, cables, platform materials)	

Use smaller structures in drainage pipe flow scenarios a:Required for a typical system design (2 monitoring systems for load comparisons).

[b] Necessary in drainage pipe flow conditions and may be necessary in low gradient surface runoff areas with the potential for submerged flow.

[c] A tipping bucket and standard rain gauge is required at each monitored field unless fields are adjacent to provide precipitation amount and intensity data.

[d] Optional feature valuable for monitoring flow conditions and confirming event occurrence at remote sites.

[e] Enclosure such as a calf hut with a propane heater will likely be necessary for year-round sampling in northern site.

Figure 1: Edge-of-field surface runoff site with a 2.5 foot H-flume.

Figure 2: Subsurface tile drainage pipe with Thel-Mar compound weir.

5) The NRCS National Water Quality Specialist must review and approve system designs that fall outside of the typical system. Any designs submitted for review must include an analysis to show that the maximum acceptable uncertainty (table 2) are not exceeded. Use the analysis method outlined by Harmel et. al. (2006a, 2009) (NEMI USDA HWQ1).

Table 2. Uncertainty estimates for the typical system and maximum acceptable uncertainty from systems not meeting the typical design (runoff volume and constituent concentrations).

Procedure	Q	SS [a]	Dissolved N (NO_3- NO_2-N, NH_4-N)	TKN	Dissolved P	TP
Discharge measurement	+10%	-	-	-	-	-
Sample Collection	-	+18%	+8%	+13%	±8%	+13%
Preservation & Storage	-	± 0%	+14%	+10%	+16%	+12%
Laboratory Analysis	-	+5%	+12%	+15%	+12%	+18%
Typical System – Cumulative Uncertainty	**±10%**	**±19%**	**±20%**	**±22%**	**±22%**	**±25%**
Maximum Acceptable – Cumulative Uncertainty [b]	**±15%**	**±20%**	**±25%**	**±30%**	**±25%**	**±30%**

[a] Suspended Sediment – This can be total suspended sediment or suspended sediment concentration.

[b] Approximately the 75th percentile of data collected with the proper use of accepted methods and reported in Harmel et al. (2009).

Pre-calibrated flow control structure

1) A pre-calibrated flow control structure and appropriate approach (e.g., H-type flume or V-notch weir) is required to allow accurate discharge measurements by continuous recording of stage. The flow control structure must be capable of capturing and passing the peak flow from a 10-year recurrence interval runoff event.

2) Watershed drainage area, watershed slope, and soil hydrologic properties are all important factors to consider in sizing the structure.

3) A site-specific estimate of peak discharge can be determined using the USDA-NRCS Runoff.

Curve Number Method (USDA-NRCS, 1991) or other methods as described and approved in the Quality Assurance Project Plan (QAPP).

4) Watershed size should be a consideration. System cost and installation difficulty increase considerably as watershed size and therefore structure size increases.

5) Year-round sampling is required. If frozen conditions are expected, encasing the flume outlet and sampling system in a heated structure will allow wintertime sampling.

Depth (stage) sensor

1) A depth (stage) sensor (e.g., bubbler, pressure transducer, non-contact sensor, and/or float; Buchanan and Somers, 1982; USDA-NRCS, 2003) is required to provide continuous stage measurements with which to calculate the flow rate.

2) The depth sensor must be compatible with the automated sampler (described subsequently).

3) Install the depth sensor in a stilling well when appropriate for protection and for creation of a uniform water surface for improved measurement accuracy. Routine activation and calibration is necessary to assure accurate depth measurement for all sensor types.

4) Installation of a permanent staff gauge is recommended (USDA-NRCS, 2003). Establish a survey reference elevation point to calibrate stage sensors (Brakensiek et al., 1979; Haan et al., 1994).

5) A mounted cork gauge in the flow control structure to correlate high water marks with peak stage recordings.

Area velocity flow meter

1) An area velocity flow meter may be needed if frequent periods of submergence occur (figure 3).

2) If needed, the flow meter must be compatible with the automated sampler, which will serve as the electronic data logger to store velocity data.

3) Area velocity meters typically use a pressure transducer and an ultrasonic sensor to measure water depth and velocity and are typically self-contained and resistant to interference from debris; therefore, they are appropriate for use in pipes or channels.

Figure 3: Two pipe outlets where frequent periods of submergence occur.

Rain gauge

1) A tipping bucket and standard rain gauge is required at each monitored field unless fields are adjacent. The tipping bucket provides incremental precipitation amount and intensity while the

standard gauge verifies the precipitation total.

2) The rain gauge(s):
   a. Must be at least 50 ft from any obstruction more than 1.5 times its height and must be mounted in such a way (on a sturdy post) as to prevent significant movement from wind during storm events.
   b. Should be compatible with the automated sampler. The automated sampler can serve as the electronic data logger to store a continuous precipitation record.
   c. Use a National Oceanic Atmospheric Administration (NOAA) or equivalent standard rain gauge (20" capacity) to confirm or correct bias in tipping bucket totals.

Automated sampler

1) The outlet of each field must have an automated sampler system to collect samples for water quality analysis. The sampler system should meet the following specifications:
   a) Capable of storing at least 30 days of sensor data in memory for retrieval with a rapid transfer device or a computer.
   b) Must be programmable using the keypad and display on the sampler.
   c) Collect samples using a peristaltic pump, that will produce typical line velocities of 3.0 feet per second (ft/s) in a 3/8 inch ID suction line at 3 feet (ft) of head and 2.2 ft/s at 25 ft of head.
   d) Pump must be capable of lifting a sample 28 ft and must maintain a line velocity of 2.2 ft/s without the use of a remote pump.
   e) The sample stream must be a direct path from sample source to sample bottle. Samples must not pass through metering chambers or other diversions.
   f) The sampler must typically deliver sample volumes with an accuracy of 10 milliliters (ml) or 10% of the programmed value, whichever is greater.
   g) The sample volume repeatability must be 5 ml or ±5%, whichever is greater.
   h) The sampler must use a non-wetted, non-conductive detector to sense the presence of water. The sensor must not be dependent on, or affected by the chemical or physical property of the water or its contents. The sensor must not require routine maintenance or cleaning.
2) The sampler must also use the following sampling components:
   a) Flow-weighted composite sampling to obtain the EMC of the monitored constituents.
   b) The typical system will use a 16 L collection bottle. Data collectors who elect to obtain flow-weighted samples in multiple bottles to gain information on within-event (temporal) concentration dynamics are still required to provide an EMC for each constituent in each event.
   c) Individual sample size (200 ml).
   d) Sampling interval/pacing will be 1.27 millimeters (mm) volumetric depth.
      i) Volumetric depth represents mean runoff depth over the entire watershed. Referring to discharge intervals in volumetric depth as opposed to volume such as m^3, normalizes discharge, enabling consistent transfer of methods and results to watersheds of different sizes.
      ii) A 1.27 mm sampling interval and a 200 ml sample size will allow for the collection of 101 mm (4 in) of runoff in a 16L bottle.

e) Minimum flow rate (event sampling) threshold

i) Substantial uncertainty error is introduced as minimum flow thresholds are increased Harmel et al. (2002). Therefore, minimum flow thresholds should be set such that even small events with small increases in flow depth are sampled (in other words if water is flowing at sufficient depth to submerge the sampler intake, then sample). This will ensure sampling occurs over as much of the event duration as possible.

ii) To prevent pump malfunction, ensure the sampler intake is completely submerged at the event-sampling threshold.

iii) The sampler intake should be located in the well-mixed portion of flow.

iv) Do not use the programming option of collecting a sample each time flow rises and/or falls past the threshold because flow fluctuation near the threshold can result in inappropriate and unnecessary samples.

Additional Onsite Equipment

1) Reliable power source

a) Electricity on site is ideal

b) 80-120 watt solar panel to charge a deep cycle battery is an acceptable alternative

2) Lockable equipment shelter to protect data collection system

a) Fabricated structures or commercial tool boxes are acceptable.

b) Attach shelter to a platform deck with lag screws or bolts and securely anchor the deck to the ground.

c) Locate shelter above the highest expected flow elevation and ensure accessibility during high flows (Haan et al., 1994; USEPA, 1997).

d) List livestock, rodent, and insect control measures in the QAPP.

3) Duplicate equipment (optional). It is important to have duplicate equipment in inventory in order to service the monitoring system during routine site visits. Proper maintenance limits data loss and equipment malfunctions (Harmel et al., 2003), which if allowed, increases the uncertainty in measured data. Suggested equipment includes but is not limited to:

a) 1 automated sampler

b) 1 depth sensor

c) 2 batteries

d) 2 extra sets of sample collection bottles (recommended for periods with frequent events).

4) Tools and supplies

a) Water jug large enough to fill the stilling basin for depth calibration.

b) Ruler or tape to measure flow depth if structure does not have a staff gauge.

c) Maintenance check list and log

DELIVERABLES

The QI must provide documentation showing all the tasks indicated in the **General Requirements** section, the **Technical Requirements** section, and the following sections:

Cover Page

Cover page reporting the technical services provided by the QI. Cover page(s) must include the following:

1) CEMA name and number.
2) Participant information: Name, farm bill program name, contract number (QI obtains contract number from participant), land identification (e.g., state, county, farm, and tract number).
3) QI name, address, phone number, email.
4) A statement by the QI explaining how they currently meet the Qualified Individual Requirements for this CEMA. Attaching or enclosing a copy of documentation for how the QI requirements are met is encouraged. Examples include:
   - Certification Name and Number,
   - License Name and Number,
   - Agricultural Retailer Business Name, or
   - Other brief written statement indicating how the requirements of a QI for this CEMA are met.
5) A statement by the QI that services provided meet NRCS requirements, such as:

   I certify the work completed and delivered for this CEMA:
   - *Complies with all applicable Federal, State, Tribal, and local laws and regulations.*
   - *Meets the general requirements, technical requirements and deliverables for this CEMA.*
   - *Is consistent with and meets the conservation objectives for which the program contract was entered into by the participant.*
   - *Addresses the participant's conservation objectives for this CEMA.*

   QI Signature: ___________________________________*Date:* _______________
6) A Participant's acceptance statement, such as:

   I accept the completed CEMA deliverables as thorough and satisfying my objectives.

   Participant Signature: _____________________________*Date:* _______________
7) A space for an NRCS reviewer to certify the agency's acceptance of the completed CEMA and, such as:

   NRCS administrative review completion by:

   Signature: _____________________*Title:* _________________*Date:* _______________

Maps

1) At a minimum, all maps developed for the CEMA will include:
   a) Title block showing:
      i) Map title.
      ii) Participant's name (individual or business).
      iii) Prepared with assistance from [QI Name].
      iv) Date prepared.

   v) Map scale.
   vi) North arrow

2) Provide information needed to locate the assessment or monitoring area, such as geographic coordinates, public land survey coordinates, or a general location map of the implementation areas showing access roads to the location.
3) For soil testing, show soil map units and sample locations.
4) For water testing, show location of well or intake being sampled, as well as Deliver Completed Work.

Deliver Completed Work

1) The QI must Prepare and provide their participant two sets of the items listed in Deliverables, including the Installation report (Appendix B). All items submitted to the NRCS field office should be in electronic format following the naming conventions outlined in Appendix A.
2) One set is for the participant to keep.
3) The other set is for the local NRCS Office.
4) The QI may transmit a set of the completed work to the local NRCS Office, if their participant has authorized it.

It is recommended to provide the NRCS field office an opportunity to review the CEMA deliverables, prior to asking for their acceptance.

References

Brakensiek, D.L., H.B. Osborn, and W.J. Rawls, coordinators. 1979. Field Manual for Research in Agricultural Hydrology. Agriculture Handbook No. 224. Washington, D.C.: USDA.

Buchanan, T.J., and W.P. Somers. 1982. Chapter A7: Stage measurement at gaging stations. Techniques of Water-Resources Investigations of the U.S. Geological Survey, Book 3. Washington, D.C.: USGS.

Haan, C.T., B.J. Barfield, and J.C. Hayes. 1994. Design Hydrology and Sedimentology for Small Catchments. New York, N.Y.: Academic Press.

Harmel, R.D., R.J. Cooper, R.M. Slade, R.L. Haney, and J.G. Arnold. 2006a. Cumulative uncertainty in measured streamflow and water quality data for small watersheds. Trans. ASABE 49(3): 689-701.

Harmel R.D., K.W. King, and R.M. Slade. 2003. Automated storm water sampling on small watersheds. Applied Eng. Agric. 19(6): 667-674.

Harmel, R.D., K.W. King, J.E. Wolfe, and H.A. Torbert. 2002. Minimum flow considerations for automated storm sampling on small watersheds. Texas J. Sci. 54(2): 177-188.

Harmel, R.D., D.R. Smith, K.W. King, and R.M. Slade. 2009. Estimating storm discharge and water quality data uncertainty: A software tool for monitoring and modeling applications. Environ. Modeling Software 24:832-842.

NEMI. 2012. National Environmental Methods Index: Methods and Data Comparability Board chartered under the National Water Quality Monitoring Council. Available at: http://www.nemi.gov

USDA-NRCS. 1989, revised 1990 and 1991. National Engineering Handbook, Part 650, Engineering Field Handbook, Chapter 2 Estimating Runoff and Peak Discharges. Washington, D.C. (NEH 650.02)

USDA-NRCS. 2003. Part 600: Introduction. National Water Quality Handbook. Washington, D.C. USDA-NRCS.

USEPA. 1997. MONITORING GUIDANCE FOR DETERMINING THE EFFECTIVENESS OF NONPOINT-SOURCE CONTROLS. EPA 841-B-96-004. WASHINGTON, D.C.: USEPA.

Glossary

Adaptive Management - Process of adjusting management operations to achieve a future desired condition based on input gathered through monitoring or evaluation techniques.

Area Velocity Meter - A device that measures both water level and flow in a channel or pipe by emitting signals and recording the time for those signals to reflect and return back to the sensor.

Automated Sampler - A device used to automatically sample runoff passing through a water control structure and temporarily storing in a container until a field technician can process the sample.

Bubbler - A type of water level device that measures depth by estimating the pressure required to emit a “bubble”. As the water level increases, the pressure required increases.

Composite Sampling - A sampling scheme where multiple samples are combined in order to comprise one representative sample.

Constituent - A water quality parameter such as total nitrogen, nitrate, or soluble reactive phosphorus that is being evaluated through monitoring.

Cork Gauge - A non-recording gauge based on the “bathtub ring principle”. It consists of a PVC pipe containing a wooden dowel and granulated cork. As the water rises, so does the powdered cork. When the water goes down, the cork granules remain stuck to the wooden dowel at the level of highest water.

Data Logger - An instrument capable of storing data generated by a measuring device and transferring the information electronically on demand to a computer.

Discharge - A measurement of the volume rate of water as it flows through a given cross-sectional area (e.g., cubic feet per second). Another term used to describe stream flow.

Edge-Of-Field Monitoring - Field scale watershed monitoring involving the capture and analysis of surface and subsurface drainage. Runoff sampling occurs in the field or at the edge of a field prior to entering a defined drainage channel such as a ditch or a stream.

Event Mean Concentration (EMC) - A common method for reporting constituent concentrations defined as the arithmetic mean of individual sample concentrations collected on equal discharge (flow-weighted) intervals.

H-flume - A water control structure of specific design geometry capable of allowing runoff to pass through it for the purpose of measuring discharge.

Load - Mass of constituent transported. The EMC multiplied by the total flow volume represents the constituent load.

Model Validation - The process of verifying, through data collection and analysis, that a mathematical representation of situation approximates reality.

Nitrate Nitrogen (NO3-N) - One of many forms of nitrogen that exists in the environments. Nitrate

(NO_3^-) carries a negative charge and is soluble in water. This form can be beneficially used by plants or be harmful to living organisms when concentrated in water.

Nitrite Nitrogen (NO2-N) - A relatively unstable form of nitrogen that quickly converts to nitrate in the presence of oxygen.

Peristaltic Pump - A type of pump used in automatic water samplers that pumps water by using a roller on a tube to compress and pump fluid.

Pollutant - A contaminant present at a concentration sufficient to cause harm to living organisms.

Pressure Transducer - A type of water level device that converts pressure exerted on a mechanical membrane into an electronic signal.

Quality Assurance Project Protocol (QAPP) - A document that describes the activities of a project involved with the acquisition of environmental information, whether generated from direct measurement activities or collected from other sources.

Recurrence Interval - The historical chance that a particular storm event can produce precipitation or runoff of a given magnitude in a given year. Recurrence interval may be expressed in percent, or in years. For example, a 5 year recurrence interval is equivalent to a 20% chance.

Soluble Reactive Phosphorus (Ortho-P) - A form of phosphorus (PO_4^{3-}) that is readily soluble in water.

Staff Gauge - A type of ruler used to quickly measure surface level in reservoirs, rivers, streams, irrigation channels, weirs and flumes. When used with granulated cork in a tube, this gauge has the capacity to record the peak stage that occurred during a storm event. (see cork gauge).

Stage - The height of the water surface at a location along a stream, river, or as runoff exits the edge of a field through a water control structure.

Standard Rain Gauge - A non-recording gauge is a Standard Rain Gauge. Typically, it is a metal cylinder with a funnel on top and a plastic measuring tube in the middle. The measuring tube can handle up to 2.00 inches of rain before overflowing into the larger outer cylinder. During the winter, the observer removes the funnel and inner tube and allows the snow to collect in the outer tube. The observer then melts the snow and measures it, getting an accurate water equivalent to report.

Stilling Well - A type of structure used to measure stage that allows for water levels to equilibrate in an environment with minimal turbulence to improve the accuracy of the stage measurement.

Suspended Sediment Concentration - A laboratory procedure made by measuring the dry weight of all the sediment from a known volume of a water-sediment mixture.

Tail Water - Water located immediately below a water control or measurement structure.

Tipping Bucket - A type of automated rain gauge that has two measuring cups with a fulcrum located in between each cup. The cup automatically empties each time it fills with a calibrated (small) volume of water. During the emptying process, the alternate measuring cup is in use. The number of times that both cups are emptied is converted to an electronically measured precipitation intensity and volume.

Total Kjeldahl Nitrogen (TKN) - A laboratory measurement of the amount of organic and ammonia nitrogen components in a sample.

Total Phosphorus (TP) - A laboratory measurement of all the forms of phosphorus (i.e., organic and inorganic).

Total Suspended Solids (TSS) - Material trapped by a filter paper, including silt, decaying plant and animal matter, or wastes.

V-notch Weir - A water control structure that contains an opening of 45 o, 60 o, 90 o or 120 o oriented vertically in the shape of a "V" to allow water to pass through for the purpose of measuring discharge. Discharge is determined by measuring the stage of water upstream (2 times the height of the weir notch) of the weir and converting to a flow rate using a calibration curve.

APPENDIX A – NAMING CONVENTIONS AND DIRECTORY STRUCTURE

SITE NAMING CONVENTION

STCOFIPSYR01- this is the Unique Monitoring Station ID (UMSID)

- ST – two digit state abbreviation
- COFIPS – three digit FIPS code
- YR – two digit year – This is the Fiscal Year the contract is approved.
- 01, 02, 03 etc. – number assigned by the state water quality specialist at onset of a contract application

DIRECTORY STRUCTURE [1] AND FILE NAMING CONVENTION

Field Office Server

S:\Service_Center\NRCS\Monitoring\Submitted\{Payment Year}\{UMSID}

\Installation

Installation Report.xls --- install_{UMSID}.xls
Qapp.docx --- QAPP_{UMSID}.docx
Monitoring plan.docx ---- mon_plan_{UMSID}
Water Quality Operations Data.xls------ WQOD_install_{UMSID}.xls

\PHOTOS [2]

YY_MM_DD_##_{UMSID}.jpg

\Semi_Annual_Data

Water and Flow Data.xls ------- waterflow_semi_{UMSID}.xls
Checklists or Logbook.xls or .pdf------Maintenance_semi_{UMSID}.xls or .pdf
Water Quality Operations Data.xls------ WQOD_semi_{UMSID}.xls
Water Quality Data.xls------- WQData_semi_{UMSID}.xls
Lab Analysis Reports.pdf or .xls ------ Lab_semi_{UMSID}.pdf or .xls

\PHOTOS

YY_MM_DD_##_{UMSID}.jpg

\Annual_Submittal

Water and Flow Data.xls ------ Waterflow_annual_{UMSID}.xls
Checklists or Logbook.xls or .pdf--- Maintenance_annual_{UMSID}.xls or .pdf
Water Quality Operations Data.xls-------- WQOD_annual_{UMSID}.xls
Water Quality Data.xls----- WQData_annual_{UMSID}.xls
Lab Analysis Reports.pdf or .xls ------ Lab_annual_{UMSID}.pdf or .xls
Data Summary.docx

\PHOTOS

YY_MM_DD_##_{UMSID}.jpg

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[1] Monitoring data provided to NRCS contains Personally Identifiable Information (PII). At a minimum, these data must be transmitted in a zipped and password protected format.
[2] Maximum allowable photo resolution is 1.9 megapixels (1600X1200). All photographs must be date stamped. Photographs will not receive automatic backup from ITS (Information Technology Services).

\Comprehensive
Report.docx------comp_report_{UMSID}.docx

\GIS
Drainage Area polygon shapefile-----------da_{UMSID}
Location point shapefile (UTM NAD83 ZoneXX)--------loc_{UMSID}

State Office and National Office

The State Office and National Office directory structure will be exactly the same as the field office structure; however, there will be both a "submitted" and a "certified" folder. When the state specialist pulls data from the field office server, the data will be placed in the "submitted" directory until it can be certified and approved for payment. Upon certification, the state specialist will move all files to the "certified" folder. The state specialist will notify the National Water Quality Specialist that data are available for pick up.

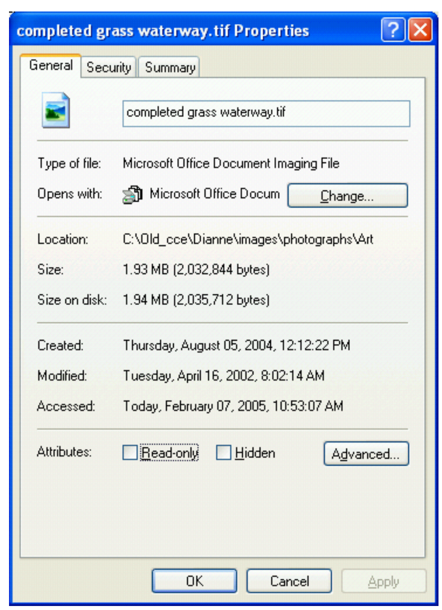
S:\Service_Center\NRCS\Monitoring\Submitted\{Payment Year}\{UMSID}\

S:\Service_Center\NRCS\Monitoring\Certified\{Payment Year}\{UMSID}\

The state specialist will need to submit a permissions request for read and write access to these folders on the service center servers. The national specialist will need to have read write access to the pertinent state servers and folders.

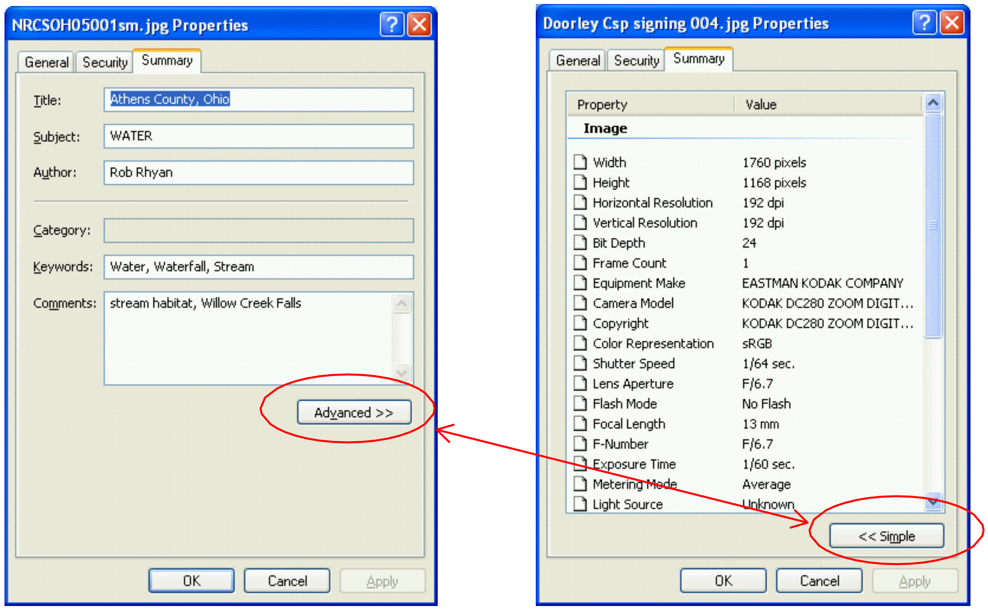
Captioning Digital Photos Using "File Properties"

1. Start My Computer
2. Select the Drive your photos are in (i.e., C, H, etc.)
3. Locate the directory your photos are in
4. Arrow over the file name and right click
5. Select Properties
6. In the General Tab, you will see information like file name, size, and date created.



7. Select the Summary Tab (Simple view)

If this is not the window you see, change to simple view.



8. This is the area to complete the necessary information.

- Title – NRCS Monitoring XX (where XX is the two digit state abbreviation)
- Subject – Water Quality
- Author – Your name
- Keywords – monitoring, water quality, Unique Monitoring Station ID (UMSID)
- Comments – Details about the picture, date of picture if it is not date stamped

Note: Be careful not to use any personally identifiable information when captioning the photo. For example do not use farm or tract number and do use participants' name.*

APPENDIX B – INSTALLATION REPORT FORM

Monitoring & Evaluation - Monitoring System Installation Report

Instructions: Complete this form for each monitoring system present following a field site to verify installation.

Site Information

Landowner:	Address:	Contract Number:
County:	Farm #:	Tract #
Monitoring System ID:	GPS Coordinates:	Receiving Drainage Acres:

Monitoring System

Item Description:	Brand/Model Number	Serial Number	File Name of Attached Photo

I certify that to the best of my knowledge the monitoring system components itemized above are installed, operational, and conform with the latest technical guidance.

Data Install/Collector Representative	Date of Installation
USDA-NRCS Field Office Representative	Date of Field Visit(s):