

Example Level 1 Qualified Data Collector Study Plan – Credible Data Program

Creekside School Study Plan

Introduction

This study plan was written for a class project at Creekside School (12433 State Route 123, Delaware County). The main elements of the study plan were taken from Ohio EPA's Credible Data rules. The data collected will be used at the school for educational purposes and submitted to the Ohio EPA Volunteer Monitoring (Credible Data) Program for inclusion in their database. Louis Reed (a science teacher at the school) is an approved Level 1 Qualified Data Collector and will serve as project manager.

Purpose

The purpose of this study is to evaluate stream characteristics in different locations and at multiple times to help students understand more about water quality. Sampling will be conducted within two different stream areas – a wooded upstream area and a residential downstream area. Sampling also will be conducted at different times of the day, at varying flow conditions, and during warmer (September) and colder (November/December) weather conditions. These multiple sampling occasions will allow students to hypothesize about changes they may see, then to take data to test their hypotheses, and finally to evaluate their data to gain a better understanding of stream ecology. Classroom lessons will also discuss other aspects of stream chemistry, ecology, and biology that will not be specifically sampled.

The study plan establishes two sampling stations per half of the study area (see attached map). The goal of multiple stations is to increase the confidence that any differences observed between the two area halves is due to the nature of the stream environment rather than just data anomalies. The purpose of sampling at multiple times is to allow students to anticipate and then evaluate differences based on time of day, time of year, and stream flow rates.

Parameters and Methods

Student samples will measure water temperature, pH, conductivity, dissolved oxygen, nitrates, and total suspended solids. Water temperature, pH, and conductivity will be measured with Hach Company Pocket Pal meters. Dissolved oxygen will be measured using Hach Method 8229. Nitrates will also be measured using a Hach kit (Model NI-14). Total suspended solids will be measured with 36 inch Ohio Sediment Tubes © (purchased from Lake County SWCD). All samples will be evaluated upon collection in the field so holding times and sample preservatives are not a consideration.

All samples will be evaluated in the field so holding times and sample preservatives are not a consideration. Parameters to be sampled were chosen

based on water quality learning opportunities and ease of measurement. Class discussions will evaluate factors that affect changes in these parameters and focus on human and other impacts to water quality.

Table 1 - Parameters

Parameter	Analysis Tool/ Method	Accuracy	Range
Temperature ¹	Hach Pocket Pal	+0.1°C +1 ¹	-15°to + 170°C
pH ¹	Hach Pocket Pal	+0.2 units	0.0 to 14.0
Conductivity ¹	Hach Pocket Pal	+10%	±0.5%
Dissolved Oxygen	Hach Method 8229 (available online)	+0.7 mg/L	1-10+ mg/L
Nitrates	Hach Kit NI-14 (available online)	?	0-1.0 mg/L 0-10 mg/L
Total Susp. Solids ²	Ohio Sediment Tube© (estimates TSS)	90% ³	0-60 cm

¹ – Information obtained from Hach Pocket Pal manual (on-line)

² – Purchased from Lake County SWCD

³ – Sediment Stick found to have 90% correlation with Total Suspended Solids by Ohio EPA (Anderson and Davic, 2004)

Samples will be collected using a 500 mL plastic beaker attached to a stick. Multiple dips will be poured into a clean bucket for measurement of parameters. The beaker and the bucket will be rinsed with stream water at the sample location prior to any data collection. Samples will be collected first at the downstream end, gradually working upstream, so as not to affect water quality in downstream samples. Sampling crews will wait several hours between any upstream sampling in the morning and any downstream sampling in the afternoon.

Monitoring Sites

Four sites on Potter's Run will be monitored (see attached map of the school and surrounding areas). Potter's Run, the stream to be sampled, originates in a wooded area and emerges into a field north of Creekside School before entering a residential area to the west. Two sampling locations in the wooded area and two sample locations in public areas of the residential development will be sampled. The locations for the residential area are well downstream of the border with the woods to allow time for influences of this different stream environment to affect the stream parameters.

Table 2 – Monitoring Site Locations

Site #	Description	Latitude ¹	Longitude ¹
1	Woods – upstream	40.1648N	83.0998W
2	Woods – downstream	40.1645N	83.1004W
3	Residential – upstream	40.1644N	83.1022W
4	Residential - downstream	40.1706N	83.1029W

¹ - Location information obtained using a handheld GPS unit (Magellan SporTrak).

Quality Control Measures

Manufacturer's recommendations will be followed for all equipment. Pocket Pal meters will be calibrated according to manufacturer's instructions. The pH meter will be calibrated using buffer solutions of 4.0 and 7.0 pH. The conductivity meter will also be calibrated using a solution of sodium chloride (491 mg/L NaCl, 1000uS/cm, 500 mg/L TDS, 100mL). The meters will be rinsed between sampling stations with distilled water and prior to sample measurement with stream sample water. Samples of distilled water will be analyzed for all parameters before and after field sampling. This is to include a sample of distilled water from the sample beaker and bucket (after an initial distilled water rinse, as if it was the sample water) for quality assurance information regarding rinsing of sampling equipment.

Duplicate meter measurements will be taken by the sampling team at each location. Results within 0.2 units (e.g., 0.2°C or 0.2 pH units) will be reported as an average of two values. Larger differences will be resolved by repeating measurements. Further erratic meter readouts will be reported to Mr. Reed for further evaluation and corrective measures (e.g., battery replacement, return to manufacturer for maintenance, etc.).

Ohio Sediment Tube[®] readings will be taken twice at each location. Readings will be taken with the sampler facing away from the sun. If the initial two readings do not agree within some margin (8 inches?), a third reading will be taken to resolve the discrepancy. The final reading will be recorded as an average of two "valid" readings. If the Secchi symbol is visible when the tube is full (36 in), "36+ in" will be recorded.

Nitrate tests with results exceeding 1 mg/L will be followed by nitrate tests using the 0-10 mg/L procedures. Times will be recorded on the data sheet for the initial nitrate testing steps in order to be certain between 10 and 20 minutes pass before a reading is taken. Standardized (and timed) sample shaking procedures will also be used with one sampler being designated as the shaker for a sampling day. If any reagents are spilled or lost during the analysis procedure, a new sample will be taken and analyzed with fresh reagents.

Dissolved oxygen equipment will be cleaned in the lab prior to field sample collection. Also D.O. bottles will be rinsed with stream water prior to sampling.

All reagents will be used or disposed of prior to expiration dates.

Sampler Training

Students will be instructed in sample analytical techniques in hands-on classroom training. Additionally, the instructor (Mr. Garrison, Level 1 Qualified Data Collector #196) will oversee initial field sampling by all students and provide instruction in stream sample collection procedures (and periodically spot check performance for the length of the project). Instructor oversight will ensure consistent implementation of different methods during different sampling events (different class periods will conduct each day of sampling).

Sampler training will also specify prescribed safety procedures. These include sampling with a minimum of two students in a team, proper use of all reagents and instruments, keeping hands away from mouth and eyes when handling samples and reagents, and washing hands with soap and water after all sample handling.

Schedule for Data Collection and Reporting

Data will be collected from September through December 2007. Data analysis will occur during January and February 2008 and submission of data to Ohio EPA is anticipated by March of 2008.

While all data will be provided to the Ohio EPA, Volunteer Monitoring Program, interpretation of data will be within the school. Students will generate reports in teams of three and reports will be submitted to Mr. Garrison for grades.

Data Presentation and Interpretation

Each student team will be responsible for a report summarizing and interpreting all surface water data collected. Interpretation of data must include analysis of sample results comparing differences between sample locations, sample collection times (morning vs. afternoon), sample collection months (warmer vs. colder), and sample flow variations (during/post rain event vs. low flow). Additional considerations may also be analyzed and may be discussed with Mr. Garrison. Reports may present graphs, use statistics, or include other tools for analysis as discussed in class. Reports may also include a discussion of recommended watershed management practices.

Data will also be submitted to the Ohio EPA via the Credible Data Online Application (accessible via the Ohio EPA eBusiness Center <https://ebiz.epa.ohio.gov/loginAction.li>). Data can only be submitted to this application by the lead QDC. The lead QDC may delegate rights to others to help enter data to the system but the lead QDC will review all data prior to submittal. All project data must be submitted for the data to be accepted by the Credible Data Program.

Trespassing

The Qualified Data Collector (Mr. Louis Reed, QDC #196) has not been guilty of a trespassing violation. Student samplers will also sign a sheet indicating they have not been guilty of a trespassing violation. Any student that has been convicted of trespassing within the last five years will not sample (alternate project duties will be performed). All samples will be collected on school grounds, on public/common property in the residential area, or on the wooded property belonging to Ms. Rachel Carson, who has given the school her written permission for this project.

Louis Reed (signature): _____

**Study Plan Attachment A –
Data Sheet for Creekside School**

Date: _____ Time: _____ Air Temperature: _____

Weather: _____ 48 hr. Rain Events/Amounts _____

Sampling Location: _____

Sampler Names: _____

Flow Conditions (circle one):

None Low Moderate High Flood

Stream Observations (algae, unusual color, odor, etc.): _____

DATA RESULTS

Water Temperature: _____ °C

pH: _____ units

Conductivity: _____ mS/cm

Total Suspended Solids (Ohio Sediment Tube[®] from Lake County SWCD)

Reading #1: _____ cm Reading #2: _____ cm

Average Reading: _____ cm

Dissolved Oxygen: _____ mg/L

Nitrates (Hach Kit Model NI-14, Follow Hach Procedure – available online):

Finish Step #5 - Time Start: _____ Step 6 - Time End: _____

Final Nitrate Reading: _____ mg/L

Contact Phone Number: Mr. Reed @ (740) 555-1212
School Office @ (740) 555-2121
Emergency Phone Number: 911

Creekside School - Stream Sampling Map



