Generic Quality Assurance Project Plan for Maine Stream Corridor Survey

Maine Department of Environmental Protection
Bureau of Water Quality
Division of Environmental Assessment
Watershed Management Unit

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DEP # LW-1241

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Project Management

A3 - Distribution List

This is a generic Quality Assurance Project Plan (QAPP) for grant projects funded through the Maine Department of Environmental Protection (DEP) using Clean Water Act (CWA) Section 319 or 604(b) funds that include Stream Corridor Surveys. A Survey Implementation Plan (SIP) will be written for project specific work (see Appendix B-SIP Template). Table 1 lists individuals who will receive a copy of the approved QAPP and any subsequent revisions. Others involved in site specific work will receive the generic QAPP as needed. This includes the project manager, technical leaders, and contractors/subcontractors.

Table 1: QAPP Distribution List

QAPP Recipient	Role	Organization	Email and Telephone
Wendy Garland	Maine DEP-NPS Program Coordinator	Maine DEP-Bureau of Water Quality (Division of Environmental Assessment)	wendy.garland@maine.gov 207-615-2451
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A4 - Project and Task Organization

Included in this section:

- *Organizational chart.*
- *Key personnel and organizations involved in stream corridor surveys.*
- *Specific roles and responsibilities.*

Figure 1 Project Organizational Chart below illustrates how the Maine DEP Nonpoint Source (NPS) Program and Quality Assurance oversight is organized. Through a RFP process, the NPS Program provides funding to nonprofits, governmental and quasi-governmental organizations to carry out watershed planning, surveys or implementation projects. Each NPS project is assigned to a Division of Environmental Assessment (DEA) staff person who provides administrative and sometimes technical oversight/assistance.

Figure 1 – Project Organizational Chart

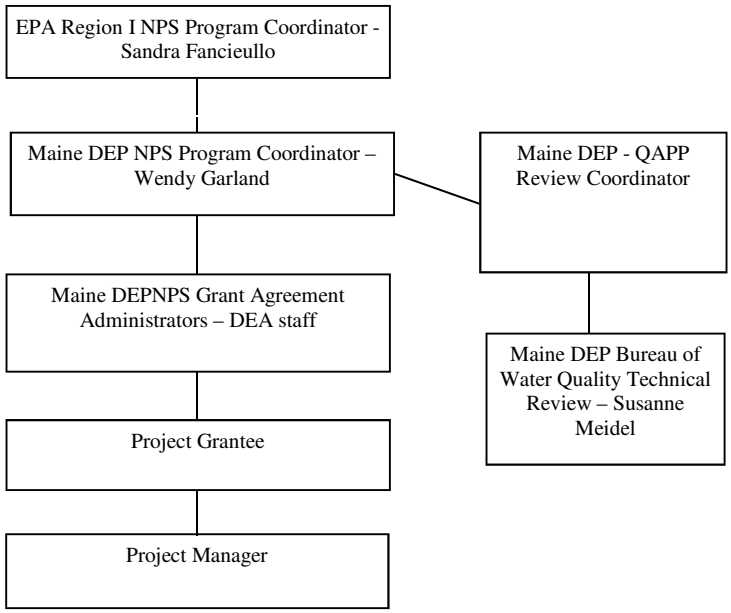

Table 2 lists the roles and responsibilities of staff involved in stream corridor survey projects. Specific roles and responsibilities for each project are identified in the Survey Implementation Plan (SIP). The Project Specific Manager will be responsible for developing the SIP.

Table 2: Personnel Responsibilities and Qualifications

Name and Organization	Responsibility	Qualifications
Wendy Garland - Maine DEP	Provides oversight of NPS Program; ensures that project work plans include QAPP/SIP	Program Manager/Environmental Specialist IV
Staff- Maine DEP Division of Environmental Assessment	Oversee grant-funded specific projects; may provide technical assistance	Environmental Specialist III or Biologist
Project Manager	Manage project	Qualified water resource professional
Technical Leaders	Lead survey team	Qualified water resource professional
Volunteers	Assist with data collection	Trained in stream survey methods

Principal data users may include USEPA, Maine DEP-DEA, regional watershed organizations and local municipalities. Secondary users may include Maine Department of Inland Fisheries and Wildlife (DIF&W), consultants and the public.

A5 - Problem Definition/Background

Included in this section:

- *Description of the problem that stream corridor surveys are designed to address.*
- *How stream corridor survey data will be used and who will use it.*

"The Division of Environmental Assessment (DEA) is responsible for monitoring and assessing the health of Maine's waters. DEA also develops recommendations for water quality standards pursuant to the Federal Clean Water Act (33 U.S.C. § § 1251 et seq.) and State of Maine Article 4-A, Maine's Water Classification Program (38 M.R.S. §§ 464 et seq.); oversees the Invasive Aquatic Species Program (38 M.R.S. §§ 1871, 1872) and administers the Watershed Management Program, which protects and restores the quality of threatened and impaired surface waters using grant funds available through § 319 of the Clean Water Act."

"The Watershed Management Unit is responsible for coordinating the NPS Management program, assessment of priority watersheds throughout the state and for providing assistance to local and regional groups for protecting or restoring water quality in these watersheds. The unit focuses on waters that are either threatened, or do not attain their water quality classification due to nonpoint source pollution. The staff provides support for watershed surveys to find the causes for water quality impacts and assists in developing plans for protection or restoration. Unit staff provides administrative oversight of CWA Section 319 and 604(b) nonpoint source grant awards to develop and implement these plans."

"The Watershed Management Unit is responsible for administering an annual Federal grant of approximately $1.8 million dollars for the purposes of reducing or eliminating nonpoint source pollution. The funding, available through § 319 of the CWA, is awarded by EPA as part of a Performance Partnership Agreement with the Department. It is used to support watershed management work within the division. An annual competitive pass-through grants program is administered that awards and monitors sub-grants of federal CWA §§ 319 & 604(b) funds for watershed projects to help restore or protect lakes, streams, rivers or coastal waters from NPS pollution. These grants help communities identify nonpoint water pollution sources, prepare watershed-based management plans (WBPs), and implement WBPs." [1]

To carry out its focus of investigating the causes of water quality impacts, the Watershed Management Unit uses and promotes the use of surveys to identify nonpoint source problems in watersheds and assess watershed conditions. The Level 1 Stream Corridor Survey (SCS) is a screening level, in-stream survey technique for wadeable streams created by the Maine DEP in collaboration with the Maine DIF&W. It consists of two survey techniques- stream habitat survey and rapid geomorphic assessment. Stream corridor surveys are used for the following purposes:

[1] Maine Department of Environmental Protection. December 2017. 2018 Work Plan-Bureau of Water Quality.

- Identify streams, reaches or sites having high quality habitat; having moderately or highly degraded habitat; or significant pollution problems that are in need of more detailed follow-up survey or assessment work
- Screen the general stability and overall condition of stream reaches
- Identify reaches having significant sediment sources and/or large volumes of stormwater which may cause channel instability
- Identify reaches that may have been altered by channelization, floodplain alteration, riparian zone degradation, etc.
- Allow comparisons of stream characteristics and conditions between different streams or reaches of the same stream
- Provide information useful for the management of stream water quality, habitats, fisheries, and riparian lands
- Promote education and stewardship

The data may be used by the USEPA, Maine DEP, project managers, municipalities and regional watershed organizations for watershed based planning and watershed implementation activities.

A6 – Project/Task Description

Included in this section:

- *General description of the work to be performed and where it will take place.*
- *Kinds of information that will be collected.*
- *How results will be evaluated.*
- *Project timeline and major tasks.*

Project Description

Stream corridor surveys are reach based surveys, rather than specific site surveys. A reach is a length of stream that has similar physical and habitat characteristics. The stream corridor survey is a combination of two survey techniques: Stream Habitat Survey and Rapid Geomorphic Assessment. It is based on a protocol known as Stream Walk, developed by USEPA's Regional Office in Seattle, Washington and modified by Maine DEP and Maine DIF&W's Fisheries Research Section. It was formalized by Maine DEP in the publication, "Stream Survey Manual (Volume I): A Citizen's Guide to Basic Watershed, Habitat, and Geomorphology Surveys in Stream & River Watersheds" (February 2009). Specific nonpoint source and riparian problems may also be documented.

- Stream Habitat Survey assesses overall conditions of the stream's habitat and corridor. The protocol consists primarily of visual observation of stream habitat characteristics, basic water quality conditions and potential pollution sources, aquatic life presence, and general physical attributes.
- Rapid Geomorphic Assessment gathers basic, screening level information about the fluvial geomorphological characteristics of the stream reach. Fluvial geomorphology is the study of the shape and characteristics of river and stream systems. The protocol consists of identifying the presence of indicators of stream aggradation, degradation,

widening and planimetric form adjustment. These are used to calculate a stability index and corresponding geomorphic condition.

- Optional site forms document specific locations of nonpoint source pollution and riparian zone degradation. These forms are similar to the forms used in watershed surveys and may be used as supplemental forms for stream corridor surveys. Note that if a primary purpose of the survey is to identify specific NPS issues along the stream corridor, the ***Maryland Stream Corridor Assessment Survey*** Appendix A (2001) data forms and manual may be used to supplement or replace forms provided in the Maine manual. Both methods are based on EPA's Stream Walk protocol, but the Maryland protocol has been adapted to collect more specific information about problem sites and restoration potential. Problems categories include: channel alteration, erosion site; exposed pipes; pipe outfalls; fish barrier; inadequate buffer; in/near stream construction; trash (or yard waste) dumping; unusual condition or comment. If the Maryland survey or other similar protocols are used, the method and any departures from this QAPP should be detailed in the project Survey Implementation Plan (SIP). Survey manual and materials available at http://dnr.maryland.gov/education/Pages/StreamCorridorAssessment.aspx.

Project Timeline and Major Tasks

Stream corridor surveys may take nearly a year to plan and fully carry out. However, timelines can be condensed if needed. The best time to do these surveys is in summer and early fall when the stream is most stressed and indicators of interest are best noted. Table 3 shows a typical timeline for a survey project and Table 4 provides a brief overview of the major tasks.

Table 3. Sample Project Timeline

Major Tasks	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
1. Project Design	X	X										
2. Survey Preparation			X	X								
3. Volunteer Training					X							
4. Stream Corridor Survey					X							
5. Quality Control						X						
6. Data Interpretation								X	X			
7. Final Report										X	X	X

Table 4. Sample Task Description

Task	**Activity**	**Product**
Project Design	Select stream sections to be surveyed Prepare Survey Implementation Plan Form steering committee and technical team	Survey Implementation Plan
Survey Preparation	Divide stream sections into reaches Recruit technical leaders and volunteers Plan training Publicize/send letters to property owners	Stream reach maps List of technical leaders and volunteers
Volunteer Training	Conduct optional classroom and field training	

Task	Activity	Product
Stream Corridor Survey	Complete survey of assigned reaches	Completed survey forms Photos
Quality Control	Review forms for completeness Organize photos	
Data Interpretation	Prepare preliminary summary Generate Geographic Information System (GIS) maps	
Final Report	Develop recommendations\draft report Distribute reports to partners for review Prepare final report	Draft report Final report

Task 1 - Project Design

The project manager will form a steering committee to provide overall guidance for the survey. Steering committee members include staff and/or volunteers from the municipality and local organizations who are familiar with the stream and its watershed issues. A technical team may also be created to oversee project design and serve as survey technical leaders. Technical leaders may include Maine DEP staff, Soil and Water Conservation District (SWCD) staff, consultants and other approved personnel who are qualified to lead a survey team.

If the entire stream system is too large to be surveyed, sections of the stream will be selected to be surveyed. Survey section prioritization is based on a number of factors including goals of the project, resources, safety and access concerns, and existing information.

The project manager will prepare a Survey Implementation Plan (SIP) that will be approved by the NPS Program Coordinator and Agreement Administrator prior to field work. The project manager and NPS Grant Administrator will retain a copy of the approved SIP in their respective project files. The project manager is responsible for communicating the SIP and QA/QC requirements to Technical Leaders working on the project. (See Appendix B for the SIP Template).

The SIP will reference this generic QAPP. The SIP will include a distribution list, descriptions of specific roles and responsibilities, site information, project description and schedule, and reporting requirements. Deviations from the generic QAPP will be included in the SIP. The project manager is responsible for providing procedures for deviations from the generic QAPP.

Task 2: Survey Preparation

Volunteers may be recruited by the steering committee and through survey publicity. The volunteers are informed about the training, expectations and any items they should bring to the training. The number of volunteers needed depends on the size of the stream and number of reaches to be surveyed. Each survey team will have a technical leader and may have from two-four volunteers.

The project manager uses United States Geological Survey (USGS) 1:24,000 topographic maps to delineate the stream into reaches. A reach is a relatively homogeneous stretch of stream having a repetitious sequence of physical characteristics and habitat types. Stream valley width

(how confined the stream is), stream gradient, channel sinuosity and other features are examined to define the reaches. For further information on reach delineation and the protocol for naming reaches see: Stream Survey Manual, MDEP 2009. Once in the field, survey teams may determine that reach points need to be adjusted. For example, this might involve dividing a pre-defined reach into two or more physically or biologically distinct sub-reaches.

Survey materials including field sheets, GIS reach maps, and handouts are compiled in binders for each survey team. Signs to place in car windshields are prepared to clearly identify surveyors in the field. The project manager and technical leaders gather safety equipment-first aid kits, cell phones, field gear and blaze orange clothing; and field equipment-clipboards, cameras, GPS units and meter sticks.

Task 3: Volunteer Training

If volunteers are involved and there are several volunteers, the project manager may provide training prior to the survey. This may include a PowerPoint presentation that covers background information on watersheds, stream ecology, nonpoint source pollution, fluvial geomorphology, an overview of how the survey is conducted, and safety. The technical leader for each survey team also provides training in the field. However, the role of the volunteers is to assist with monitoring by taking pictures, measuring pool depths, recording information, etc. The technical leader is responsible for oversight and review of any information that requires professional judgment.

Task 4: Stream Corridor Survey

Stream corridor survey data is documented for each reach by completing standard forms, taking digital photos and recording GPS coordinates. GPS coordinates are recorded at the beginning and end of the reach and at photo locations. The Project Manager may either choose to use photo ID flip charts which are displayed in each photo to identify the reach or keep track on the field sheet by recording photo number.

Task 5: Quality Control

Immediately after the survey is finished, all data is reviewed by the survey team technical leader to ensure the survey forms are properly completed. Completed field sheets and photos are submitted to the project manager. Photos will be labeled so they can be matched up with the field sheet-for example, labeled "Reach A1_end of reach". If there are any questions or problems with the field sheets, the project manager will contact the technical leader as soon as possible to clarify or request the information. The project manager will also ensure that reaches are correctly named and if a reach was broken into more than one reach in the field, then the name of the reach may need to be amended (e.g. Reach A3 becomes Reach A3a and Reach A3b).

Task 6: Data Interpretation

The project manager is responsible for interpreting and analyzing the data and producing a draft summary of results. GIS maps are helpful in illustrating the results.

Task 7: Final Report Preparation

The project manager prepares a final report. The survey report includes stream overview, maps, raw data, photographs, summary of conditions of each reach, discussion and recommendations.

Members of the steering committee and technical team review the report and provide feedback. The survey report may also be shared with town officials and the volunteers.

A7 - Data Quality Objectives

Included in this section:

- *Description of the DQOs in place to ensure quality measurement data: precision, accuracy, measurement range, representativeness, comparability and completeness.*

Data Quality Objectives (DQOs) are the quantitative and qualitative terms used to describe how good your data needs to be to meet your project's objectives. DQOs for measurement data are precision, accuracy, measurement range, representativeness, comparability, and completeness. (USEPA 1996)
Precision is the degree of agreement among measurements of the same characteristic, or parameter, and gives information about the consistency of your methods. *Accuracy* is a measurement of confidence that describes how close a measurement is to its "true" value.
Measurement range is the range of reliable readings of an instrument or measuring device, as specified by the manufacturer.
Representativeness is the extent to which measurements actually represent the true environmental conditions.
Comparability is the degree to which data can be compared directly to similar studies. Using standardized sampling, analytical methods, and units of reporting helps to ensure comparability.
Completeness is the comparison between the amount of data you planned to collect versus how much usable data you collected, expressed as a percentage.

Precision, Accuracy and Measurement Range
The planning and reach delineation steps use secondary data. This includes USGS topographic maps as a layer available in GIS or paper copies.

Stream corridor survey teams use GPS to identify the start and endpoint of each reach and photo locations. Start and end points are also marked on the topographic map. The GPS units are provided by Maine DEP and/or technical resource groups (e.g. SWCDs, consultants) who serve as technical leaders for the survey. The Maine DEP and other resource agencies are responsible for ensuring that the units are properly operating and set to the correct coordinate system. Measurements are made in either UTM (Universal Transverse Mercator) which is preferred or latitude/longitude, using either NAD83 or WGS84 datum. In most cases, the coordinate system will be set to UTM Zone 19, NAD 83. The survey form provides the correct number of digits to help reveal errors with system settings (see Table 5 for the survey form excerpt when using UTM.). Site location data is recorded after at least 3-4 satellites have been acquired by the GPS unit. GPS location data also includes a measure of GPS accuracy.

Table 5: GPS Coordinate Section of Stream Corridor Survey Form

GPS Location	**Easting** (ex: 0396812)	**Northing** (ex: 4838054)	**Accuracy** (ex: 16') Ft.	**Position in Reach:** (Upstream or Downstream)
Start	0 __ __ __ __ __ __	__ __ __ __ __ __ __	___	_____stream
End	0 __ __ __ __ __ __	__ __ __ __ __ __ __	___	_____stream

Representativeness
Sections of the stream to be surveyed are divided into stream reaches. A stream reach is a relatively homogeneous stretch of a stream having a repetitious sequence of physical characteristics and habitat types. The extent of stream corridor surveyed depends on the size of the stream or river and resources available. For small streams, all or a majority of the stream corridor are generally surveyed. For larger streams and rivers, it may not be feasible to survey the entire riverine system. In this case, the project manager and technical team will prioritize sections to be surveyed. For example, they may choose to focus on impaired tributaries and the sub-watersheds that are most highly developed. A smaller number of similar reaches that are not or less impacted may also be included as reference conditions

Comparability
Stream corridor surveys follow protocols in the Stream Survey Manual, MDEP 2009. Standardized Stream Corridor Survey-Level 1 field forms in the manual are used. The field forms consist of two parts- Stream Habitat Survey and Rapid Geomorphic Assessment. The survey manual includes instructions for completing the Stream Habitat Survey that includes illustrations. The Rapid Geomorphic Assessment is more difficult for the average volunteer to complete as it involves concepts and terminology that most volunteers are not familiar with. To aid both inexperienced and experienced surveyors, a picture key that has photos, illustrations and notes for each geomorphic indicator is utilized. However, each survey team technical leader has overall responsibility for oversight and review of any information that requires professional judgment.

Completeness
Stream corridor surveys are not used for legal or compliance requirements. Additionally, there is no requirement that a certain percent of data be collected to meet statistical requirements. For surveys that are completed using Clean Water Act funds, it is expected that the proposed survey areas will be completed. If portions of the stream will not be surveyed due to resource limitations or other reasons, these exclusions will be described in the SIP.

A8 - Training Requirements

Included in this section:
- *Training requirements needed to successfully complete tasks.*
- *How training will be provided and how to evaluate performance.*

Project managers are qualified biologists, hydrologists, geomorphologists or water resource professionals. Technical leaders are staff or consultants who have a background and experience

in stream ecology, fluvial geomorphology, and/or fisheries management. Prior to serving as technical leader, individuals shall either 1) participate in a separate stream corridor survey, alongside an experienced technical leader or 2) be approved by Maine DEP (based on education and experience). An optional field session may be held for technical leaders prior to the survey to ensure that everyone understands the field methods.

The project manager and steering committee decide whether to have classroom training for volunteers- it is recommended, but not required. Volunteer field training is done as part of the survey. The technical leader evaluates and oversees volunteer performance during the field training since survey information is initially collected as a group. As volunteers become comfortable and adept at completing survey tasks, the technical leader may divide up the survey tasks among volunteers to help expedite the survey. The technical leader also evaluates performance by reviewing information collected on the field forms during the survey and at the end of the day. Table 6 describes the classroom and field training for stream corridor surveys.

Table 6. Volunteer Training Requirements

Description of Training	Training provided by
Classroom training - covers stream ecology, NPS pollution, fluvial geomorphology, field sheet completion, safety. **Field training** - Field training done "hands on" with technical leader leading survey team through survey.	Maine DEP technical staff, Maine DIF&W staff, consultants, and other qualified personnel approved by DEP.

A9 - Documentation and Records

Items in this section:

- *Field information and records needed for this project (field sheets etc.).*
- *Information on how long and where records will be maintained.*

The project manager is responsible for ensuring that the steering committee and technical team have a current version of the QAPP, SIP, survey instructions, and field sheets. The stream corridor survey forms are available online in the Stream Survey Manual, MDEP 2009. See Appendix A for a link to the field sheets.

Stream corridor survey teams are provided a binder that includes maps, field sheets, field sheet instructions, and rapid geomorphology picture key. The field sheet information may alternatively be entered into electronic versions of field sheets that are kept on field tablets or similar devices. A stream corridor field sheet and rapid geomorphology assessment field sheet are completed for each reach. At the end of the survey day, stream corridor survey field sheets are reviewed by the survey team technical leader to ensure the field sheets are filled out correctly and completely. Any questions or problems are corrected at that time. Completed field sheets and photos are submitted to the project manager who provides a second review.

The project manager will compile steering committee notes and track survey volunteers, training attendance and technical leaders. This information will be kept with the project file for a minimum of five years. The data and photos are stored electronically on the project manager's computer system and backed up daily/weekly. Hard copies of field sheets are kept at the project manager's office for a minimum of five years. The approved SIP will be stored electronically in Maine DEP Nonpoint Source files and a hard copy retained in the project file for a minimum of five years.

Measurement and Data Acquisition

B1 - Sampling Process Design

Included in this section:

- *Survey design information.*
- *How constraints such as weather, seasonal variations, stream flow or site access might affect scheduled activities, and how to handle those constraints.*
- *Site safety plans.*

Survey Design

This phase of the survey requires careful planning. The steering committee will determine the scale of the survey (i.e. extent of the stream that will be surveyed), resources available to carry out the survey, and when the survey will take place.

If feasible the entire stream corridor including tributaries is surveyed. If infeasible the project manager will work with the steering committee to prioritize sections of the stream to be surveyed. Survey planning should answer the following questions:

- What are the goals of the survey?
- What do we know about the stream? What are the existing land uses and potential problems?
- What are the access points to get in and out of the stream? Are there issues regarding landowner permissions?
- Are there safety constraints such as deep water areas or bogs?
- Who will do the training and be technical leaders? Will volunteers be recruited?

The best time for conducting this type of surveys is in the summer through early fall. Spring is not the ideal time due to generally high flow conditions from snowmelt and heavy rains. Also, leaf out has not occurred so it is difficult to assess stream shading conditions. Mid to late fall can also be problematic for several reasons. Flow conditions tend to be higher and leaf-fall makes it difficult to assess shading as well as stream habitat. Doing surveys before mid-fall also avoids spawning season of certain fish and hunting season.

Prior to field work, the project manager will prepare a SIP that will be approved by the NPS Program Coordinator and Agreement Administrator. The SIP will reference this generic QAPP. The SIP will include a distribution list, descriptions of specific roles and responsibilities, site information, project description and schedule, and reporting requirements (see Appendix B).

Safety Considerations and Planning

Prior to survey training, surveys are publicized through several possible methods. This may include press releases, flyers in locations such as the local library or town office, and/or articles in local newspapers and association newsletters. Letters may be sent to all watershed or stream corridor property owners- the letter explains the survey and requests that anyone who does not want their property accessed contact the survey organizers. Volunteers are provided a list of what to bring to the training and what to expect. Volunteers are also advised that they must be able to walk in often rugged terrain.

During the training, safety issues are reviewed and the volunteers are instructed on how to talk to property owners and when not to access private property. The training also covers potential hazards such as ticks, poison ivy, lightening and avoiding dangerous stream conditions. Each survey binder includes cell phone numbers for the technical leaders and the local emergency phone numbers. Safety vests are provided for each team to wear on busy roads or during hunting season. Survey signs are provided for each survey team to place in the windshield of their car. Maine DEP technical leaders are trained in CPR and first aid. Surveys are set up and organized so there is a team of two or more volunteers along with a technical leader for any given reach.

B2 - Survey Methods

Included in this section:

- *Description of survey methods.*
- *Information to be collected.*

Survey Methods

Field Sheets – The survey team walks the entire reach, making observations and taking measurements along the way. At the end of the reach, the survey team collectively completes a stream corridor survey field sheet. It is important to walk the entire reach before completing the field sheet. The reason for this is that habitat/geomorphic and pollution conditions may change substantially over the stream reach. The objective is to document overall conditions of the reach. Also, conditions immediately upstream or downstream of stream crossings and culverts are generally not representative of the reach. If optional site field sheets that document specific locations of nonpoint source pollution and riparian zone degradation are being used in the survey, these will be completed when the specific problem is identified. The field sheets are kept in a binder along with the reach maps, geomorphic picture key, and handouts for property owners.

Photos - Surveyors take one or two photographs of the start and end of the reach. GPS location, photo number and description are also recorded in the photo log. Volunteers are also instructed to take photographs of key features to include problems/land uses and good aspects (healthy

buffers, coldwater seeps). Each survey team may be provided with a photo ID flip chart that is used to display the reach number in each photograph. The reach number should be clearly visible in the photo.

Site Sketches – One person in each survey team completes a quick sketch of the reach on the provided Sketch Sheet (Appendix A). The sketch should include identifying features surrounding the reach (e.g., lake, road, stream, house) and important features of the reach (e.g. waterfall, dam).

Field Maps – Each survey team will be provided GIS maps. Surveyors note the reach number and start and end points directly on these maps. This serves as a way to cross check the accuracy of the GPS points.

Table 7: Supplies and Equipment

Assessment Field Sheet Item	Supplies/Equipment
Stream Name, County, Town, Investigators	None
Site Description	Map
GPS Coordinates	GPS Unit
Site or Map Number	Map
Date, Time, Weather	None
Photograph Log	Camera, GPS Unit, ID flip charts (optional)
Physical Characteristics	Thermometer, meter stick
Biological Characteristics	None
Macroinvertebrate Survey	Kick net (optional)
Comments	None
Map/Sketch of Site	Map
Rapid Geomorphic Assessment	Photo/Picture Key

B3 – Sample Handling and Custody

There are no samples associated with stream corridor surveys.

B4 - Analytical Methods

There are no laboratory or field analyses associated with stream corridor surveys.

B5 - Quality Control

Included in this section:

- *List of the types of control steps that will be taken.*
- *Description of actions taken if the QC steps reveal a sampling problem.*

Quality control for stream corridor surveys is not quantifiable and is a subjective assessment of whether data appears to be reliable and representative of the reach conditions. The following summarizes the quality control checks.

1. At the end of the survey day, the technical leader reviews the field sheets to ensure field sheets are complete. The binder is handed in to the project manager. Photos are matched up to the photo log which should include a photo number. Some groups may additionally utilize a photo ID flip chart that identifies the reach number in each photo.

2. The project manager provides a secondary review of the field sheets for accuracy and completeness. Any questions are followed up on with the technical leader as soon as possible; if deemed necessary volunteers will be consulted and/or a return to the field location in question will be arranged at the earliest convenience.

3. During the reporting process, GPS locations are spatially checked using GIS and address/location information on the field sheets.

B6 - Instrument/Equipment Testing, Inspection and Maintenance Requirements

Included in this section:

- *List of equipment that will be routinely inspected and what spare parts and replacement equipment will be on hand to keep field operations running smoothly.*
- *Description of the plan for routine inspection and preventive maintenance of field equipment.*

Digital cameras and GPS units are checked and charged, and extra batteries put in camera cases in preparation for the field survey. Organizers ensure there are enough GPS units for the training and survey day. GPS map datum should be set to either WGS84 or NAD83. The GPS geographic coordinate system should be set to either UTM (Universal Transverse Mercator) or Latitude & Longitude System. The project manager will decide which coordinate system they prefer and then make sure each GPS unit is set to the proper system. GPS coordinates are recorded when at least 3-4 satellites have been acquired by the GPS unit.

B7 - Instrument and Equipment Calibration and Frequency

There are no calibration requirements for equipment used in stream corridor surveys.

B8 – Inspection and Acceptance Requirements for Supplies

Not applicable.

B9 - Non-Direct Measures and Data Acquisition Requirements

Included in this section:

- *Types of data that are not obtained through your monitoring activities. Examples of these types of data include historical information, information from topographical maps or aerial photos, or reports from other monitoring groups.*
- *Any limits on the use of this data resulting from uncertainty about its quality.*

Stream corridor surveys use maps derived from USGS maps and State of Maine Office of GIS coverages to delineate stream reaches. The State of Maine GIS data layers typically have metadata (data used to describe other data) associated with them explaining any background information and limitations they may have.

When planning for a survey, organizers may review existing studies and other watershed information. This information can be useful in helping to prioritize survey areas and in providing knowledge about the stream. Examples of information reviewed include Maine DEP water quality data, previous studies and information obtained from GIS layers (e.g. recent aerial photographs, land use coverage data).

B10 - Data Management

Included in this section:

- *Path data takes from field collection to data storage and use.*
- *How to check for accuracy and completeness of field and lab forms, and to minimize and correct errors in calculations, data entry to forms and databases, and report writing.*
- *Examples of forms and checklists.*
- *Computer hardware and software used to manage data.*

Field sheets and photos are reviewed by the technical leader at the end of the survey day to ensure that the field sheets are complete. The field sheets and photos are then submitted to the project manager. The project manager is responsible for ensuring field sheets are submitted for all survey reaches, reviewing the field sheets, and organizing the photos electronically. The photos should be labeled so as to easily identify the photo (e.g. Reach A1_start of reach). If there are any questions or problems with the field sheets or photos, the project manager contacts the technical leader as soon as possible to request or clarify the information. The project manager also ensures that reaches are correctly named if there were any adjustments made in the field (i.e. reaches divided or combined).

The project manager is responsible for compiling the data. Data will be entered into a spreadsheet or database and reviewed by the project manager. The project manager will interpret/analyze the data and produce a project report. Maine DEP has a template report and examples that the project manager may utilize.

Hard copies of the field sheets are kept in the project manager's office files for a minimum of five years. Photos and any data stored electronically (scanned field sheets) will be stored on the project manager's computer and backed up daily/weekly.

Assessment and Oversight

C1 - Assessment and Response Actions

Included in this section:

- *How to evaluate field and data management activities, equipment, organizations (such as project partners) and individuals in the course of your project. These can include evaluations of volunteer performance or equipment functionality.*
- *Information on how your project will correct any problems identified through these assessments. Corrective actions might include increasing the number of regularly scheduled training sessions.*

Stream Corridor Surveys are completed by a survey team, which is led by a technical leader. The technical leader reviews performance of the volunteers during the survey and informs volunteers of corrections needed. Technical leaders are staff or consultants who have a background and experience in stream ecology, fluvial geomorphology and/or fisheries management. They include DEA staff, DIF&W staff, SWCD staff, AmeriCorps volunteers and consultants.

In situations where the GPS equipment has been shown to be faulty, it is replaced. If it is shown that better training is required, training requirements may be revised and/or the project manager may request additional training support from the Maine DEP to ensure that training is completed properly.

The project manager provides a secondary review of the field sheets. If errors are encountered, the project manager will confer with the technical leader. If systematic errors appear to be occurring, the project manager will determine whether a reach needs to be resurveyed, if the data is removed from the final report or other course of action.

C2 - Reports to Management

Included in this section:

- *Frequency, content, and distribution of reports to data users, sponsors, and partnership organizations that detail project status, results of internal assessments and audits, and how QA problems have been resolved.*

Projects funded with Clean Water Act funds must provide semi-annual progress reports and a final report to Maine DEP.

Data Validation and Usability

D1 - Data Review, Verification and Validation

Included in this section:

- *How to review data and make decisions regarding accepting, rejecting, or qualifying the data including a brief statement of what will be done, by whom.*

All field sheets are reviewed by the technical leader and by the project manager. There are no specific criteria for validating the data. The project manager and Maine DEP use best professional judgment in deciding to accept, qualify or reject the data.

D2 - Validation and Verification Methods

Included in this section:

- *Procedures you use to validate and verify data. This can include, for example, comparing computer entries to field data sheets; looking for data gaps; checking calculations; examining raw data for outliers or nonsensical readings; and reviewing graphs, tables and charts.*
- *Description of how errors, if detected, will be corrected, and how results will be conveyed to data users.*

Methods for verification and validation of data, including review/proofing procedures are outlined in the Data Management (Section B10) and Data Review, Verification and Validation (Section D1) sections.

Limitations in the stream corridor survey data will be defined for potential end users in all reports produced. Possible limitations that should be noted in the report include reaches that were not surveyed (e.g., properties that asked to be excluded, areas excluded due to staff limitations or inaccessibility) and possible inaccuracies.

D3 - Reconciliation with User Requirements

Included in this section:

- *Once the data results are compiled, describe the process for determining whether the data meet project objectives. This should include calculating and comparing the project's actual data quality indicators (precision, accuracy, completeness, representativeness, and comparability) to those you specified at the start of the project, and describing what will be done if they are not the same.*
- *Actions might include discarding the data, setting limits on the use of the data, or revising the project's data quality objectives.*

The NPS Program Coordinator and Agreement Administrator will determine if project objectives have been met. If the project objectives have not been met, corrective actions are initiated by the project manager. If failure to meet project specifications is found to be unrelated to equipment, methods or sample error, specifications may be revised. Revisions are submitted to the Maine DEP quality assurance officers for approval.

Any decisions regarding the usability of data will be ultimately left to the project manager and Maine DEP. When it is found that data do not meet the quality objectives or do not adhere to the quality control measures, the project manager and Maine DEP will determine what corrective action must be taken. Incomplete data may lead to the need for re-assessment of particular reaches if it is found that the data are insufficient to meet project goals. When data quality is poor, the project manager may choose to have the reach reassessed or verified, or qualify the data with a written explanation.

References

Maine Department of Environmental Protection (MDEP), February 2009. Stream Survey Manual (Volume 1): A Citizen's Guide to Basic Watershed, Habitat, and Geomorphology Surveys in Stream & River Watersheds. http://www.maine.gov/dep/water/monitoring/rivers_and_streams/vrmp/stream-survey-manual/survmanv1_mainbody.pdf . 95 pp.

Maine Department of Environmental Protection (MDEP). December 2017. 2018 Work Plan-Bureau of Water Quality. 32 pp.

Maryland Department of Natural Resources. 2001. Maryland Stream Corridor Assessment Survey Protocols. 70 pp.

U.S. Environmental Protection Agency (USEPA). 1996. The Volunteer Monitor's Guide to Quality Assurance Project Plans. Office of Wetlands, Oceans and Watersheds; USEPA document #841-B-96-003; Washington, D.C. 59 pp.

Appendix A

Stream Corridor Survey Field Sheets:
Go to this link:
http://www.maine.gov/dep/water/monitoring/rivers_and_streams/vrmp/stream-survey-manual/survmanv1_mainbody.pdf

Appendix J: Stream Corridor Survey (Level 1) Field Sheets
Appendix K: Site Form
Go to this link:
http://www.maine.gov/dep/water/monitoring/rivers_and_streams/vrmp/stream-survey-manual/survman_apps.pdf

Appendix B

Survey Implementation Plan Template:

REVIEW AND APPROVAL SHEET

Bureau: Division: Program Area:

Title of applicable QAPP:

Name of Project:

Date(s) of Proposed Work:

Principal Investigator / Program Manager:

****

Reviewer

Name: Division / Program:

Date received for review:

☐ Approved ☐ Minor revisions requested ☐ Major revisions needed (specifics attached)

Date returned to author (if applicable):

Date approved and forwarded:

Division Director or designee

Name: Division:

☐ Approved ☐ Minor revisions requested ☐ Major revisions needed

Date returned for revision (if applicable):

Date of final approval:

Survey Implementation Plan

[Project Name and Project Number]

This document describes the survey implementation plan (SIP) for the **[name] Stream Corridor Survey ("SCS")** scheduled for [time period & year]. This project is funded in part by Clean Water Act grant funds. The survey will follow the "Maine Stream Corridor Survey Quality Assurance Project Plan" (QAPP) dated November 27, 2018. This SIP is a sampling and analysis plan and is considered a part of the QAPP under which project specific activities are carried out. This SIP provides specific information about the survey such as goals and objectives of the survey, when and where the survey will occur, who will be doing the training, deviations from and stipulations not addressed in the QAPP, and related information needed to apply the QAPP to this particular project.

Prepared by:
[Name, Organization, mailing address, phone number]
[Date].

Distribution List

The following individuals will receive a copy of the QAPP, the final SIP, and any revisions made while the grant-funded project #[project number] is active.

[Grantee Name, organization, email address]
[Other Name, organization, email address]
[AA Name], Maine Department of Environmental Protection, [email address]

Project and Task Organization

Roles and Responsibilities:

Staff/Personnel (name)	Responsibility

Project Definition and Background

Include here project specific information including:

- Site Map (insert here or attach)
- Description of stream and watershed
- Background information (i.e. stream class, water quality)
- Previous studies and assessments

Watershed Description:

[Insert short description of watershed land use]

Previous Surveys and/or Assessments and/or management plans:

[Insert name and date of previous related surveys and assessments or management plan.]

Survey Purpose:

[Insert concise sentence or two about purpose of the survey – i.e. "to identify and document stream characteristics which will assist in planning and NPS pollution abatement"]

Project and Task Description

Provide a brief description of the survey including scope of the survey, who will do the training, how the project will be done (e.g. will it include volunteers)

Extent of Survey (including justification if the entire stream corridor is not surveyed):

[Describe where the survey will be done, how large the survey area is and any reasoning if appropriate]

Project Framework, Specifics, and Deviations from QAPP:

The survey will generally follow the "Maine DEP Stream Corridor Survey QAPP" (2018) and be guided by "A Citizen's Guide to Basic Watershed, Habitat, and Geomorphology Surveys in Stream & River Watersheds" (February 2009). Specifics and deviations from the QAPP are as follows:

- [Insert any expected deviations from the QAPP]

Estimated Schedule: (does not have to be specific, general timeline OK)

- [Insert date] - steering committee meeting
- [Insert date] - target date for sending out mailing to landowners
- [Insert date] - survey training day and first day of field work
- [Insert date] - survey of any remaining areas completed by
- [Insert date] - follow-up work completed by
- [Insert date] - summary findings compiled
- [Insert date] - draft report on findings
- [Insert date] - final report complete
- [Insert date] - report distribution
- [Insert any other project timeline dates]

Reports to Management

How Results are Reported and to whom:

SCS survey results will be compiled into a report by [insert person responsible for this]. The report will be reviewed by [insert person responsible for this]. [Include a brief description of what will be included in the report.]

The final report will be distributed to:
[insert organizations (and name of person if available)]

A short summary sheet will be produced for distribution to local stakeholders, including:
[insert organization or groups, i.e. local towns, local groups, residents, etc.]