"Wyoming Valley Chesapeake Bay Tributary Field Assessments and Monitoring (PA)" NFWF ID # 69485

QUALITY ASSURANCE PROJECT PLAN

COMPLETED PLAN PREPARED BY:

Michael A. Hewitt, Eastern Pennsylvania Coalition for Abandoned Mine Reclamation (EPCAMR) Program Manager

07/29/2022

Refer correspondence to:
Robert E. Hughes, EPCAMR Executive Director
101 South Main Street, Ashley, PA 18706, (570) 371-3523, rhughes@epcamr.org

QAPP APPROVALS PAGE

Approval Signatures (required prior to project start):

Robert E. Hughes

_____ Date: ___07/29/2022_____

Robert E. Hughes
Project Lead, **EPCAMR**
Executive Director

Michael A. Hewitt

_____ Date: ___07/29/2022_____

Michael A. Hewitt
Primary Field Sampler**, EPCAMR**
Program Manager

_____ Date: _____7/29/2022___

~~Stephanie Heidbreder~~ Joseph Toolan
Manager, Chesapeake Bay Programs
National Fish & Wildlife Foundation
1133 15th Street NW, Suite 1100 | Washington, DC 20005
~~Tel: (202) 595-2498 | Fax: (202) 857-0162~~ Office: (202) 888-1677
Website: www.nfwf.org/chesapeake

Durga Ghosh 09/30/2022

Durga Ghosh
CBPO QA Coordinator
Divisional Delegated Approving Official
U.S. Geological Survey
Chesapeake Bay Program
1750 Forest Drive | Annapolis | MD 21401
410-267-5750 | dghosh@chesapeakbay.net | dghosh@usgs.gov

Table of Contents

1 PROJECT MANAGEMENT

1.1 CONTACT INFORMATION

All personnel listed below will receive copies of this Quality Assurance Project Plan (QAPP), and any approved revisions of this plan. Once approved, this QAPP will be available to any interested party by requesting a copy from the project management.

Title	Name (Affiliation)	Phone Number/E-mail
Project Manager & QA Specialist	Robert Hughes, EPCAMR Executive Director	(570) 371-3523 rhughes@epcamr.org
Primary Field Sampler	Michael Hewitt, EPCAMR Program Manager	(570) 371-3522 hardcoal@epcamr.org
Environmental Scientist	John Levitsky, Luzerne Conservation District (LCD)	(570) 674-7991 x5 john@luzcd.org
National Fish and Wildlife Foundation (NFWF) Program Manager	Stephanie Heidbreder, NFWF	(202) 595-2498 stephanie.heidbreder@nfwf.org

1.2 PROJECT OBJECTIVES AND APPROACH

Objectives:
EPCAMR's focus will be on assessing, planning and capacity building to restore water quality and habitats of the Chesapeake Bay Watershed's tributary rivers and streams of Solomon Creek, Warrior Creek, Nanticoke Creek, Newport Creek, and along the Susquehanna River.in the Southern Wyoming Valley. See Appendix A – Project Site Map. These are all historically coal mining-impacted watersheds but have overlapping priorities for Eastern Brook Trout (EBT) habitat patches and American Black Duck (ABD) habitats that need assessment to protect/restore stream channels and wetlands and improve aquatic organism passage within each watershed. Neither the patch areas nor waterfowl habitat populations have been surveyed in a large portion of the watersheds identified.

EPCAMR staff will conduct field assessments of various stream and wetland habitat conditions. Along with collection of physical, biological, and chemical quantitative parameters, EPCAMR will identify qualitative conditions such as sediment-laden areas and structural impediments to aquatic organism passage. We also hope to document habitat use by these species (by visual observation). Key staff who will supervise field assessments are Robert Hughes, EPCAMR Executive Director and Michael Hewitt, EPCAMR Program Manager. Additionally, environmental scientist, John Levitsky, will counsel on wetland and species identification via photographic evidence

EPCAMR will focus on identifying sediment removal areas, aquatic passage impediments, wildlife waterfowl habitat, and stream restoration project potential in our site-specific recommendations. These recommendations will influence future planning of habitat improvement projects to reduce sediment loadings and pollution to local streams in our communities, cities, and towns along the Susquehanna River. EPCAMR will develop and improve on existing watershed and management plans that will be recommended to municipal governments, private landowners, and non-profit

organizations on how to manage properties and public spaces for improved conservation outcomes.

EPCAMR's ultimate outcome of the report is to promote the conservation objectives and planning tools tied to the NFWF Chesapeake Bay Business Plan and 2014 Watershed Agreement directly to the local governments and project partners for future restoration project implementation.

PRIORITY AND OVERALL CONTEXT:
These identified watersheds in the Wyoming Valley have been passed over for decades due to the anticipated reclamation and stream restoration project costs needed to bring back functional wildlife habitat. The majority of municipalities targeted are additionally involved as partners with the Wyoming Valley Sanitary Authority (WVSA) who have been tasked to come up with holistic approaches to improve upon the impacts that increasing impervious areas, stormwater runoff, and flooding are having locally.

EPCAMR will make a request through our partners Trout Unlimited (TU) and/or the PA Fish and Boat Commission (PFBC) to conduct a TU or PA Fish and Boat funded fishery absence/presence of Eastern Brook Trout in several headwater tributaries along the Wyoming Valley's eastern flank. The study is not paid for in this grant, and the timeline is up to TU or PA Fish and Boat Commission. We will complete this fishery study by the grant deadline and the study will be added as an appendix item in the final report. This fishery survey has already been completed in 2012 for Solomon Creek Watershed prior to this grant work and will be added as an appendix item in the final report.

EPCAMR staff will visually assess habitat, field sample chemistry and macroinvertebrates for streams and wetlands identified in this study. There will be no laboratory sampling.

WORK PLAN AND DELIVERABLES:
Anticipated to begin in Spring 2021 and end in Fall of 2022

- Conduct literature search of any applicable projects, existing watershed plans, habitat assessments, fishery reports, mining related reports, TMDLs, and monitoring related to the priority watersheds. Compile the resources as bibliography references and to establish baseline or historic conditions of the watersheds. EPCAMR, by 10/2022- Appendix of Resources, Reports, and Plans
- Work with local government officials and neighbors to identify and contact private landowners to determine if they would allow for access to streamside areas to survey conditions that might become eligible as future candidates for implementation projects with their permission and potential grant funding. EPCAMR, Local Governments, by 10/2022. ArcGIS Pro Online Integrated Story Map and Final Recommendation Report will include possible project area locations and landowner identification
- Train EPCAMR staff by Environmental Scientist, John Levitsky, PA Game Commission and PA Fish and Boat Commission in specific assessment field via the EPCAMR Field Monitoring Binder Version 3 to identify and measure habitat areas for the American Black Duck, and Eastern Brook Trout. EPCAMR, by 10/2021- List of EPCAMR Staff who become trained in field assessments
- Conduct field assessments in the Newport Creek, Nanticoke Creek, Warrior Creek, Solomon Creek in the Southern Wyoming Valley. EPCAMR, Data will be provided in the Recommendation Report and Online Story Map. 3/2021 thru 10/2021 and again in 3/2021 thru10/ 2022
- Research American Black Duck species, habitat, migratory paths, holdover areas, and seek information from local wildlife and conservation agencies like the PA Game Commission, Luzerne Conservation District, NCC, NBLT, and DU. Target area is positioned in the Atlantic Flyway as a critical connection point for waterfowl and links species between Canadian breeding and wintering grounds, between Lake Erie,

Chesapeake Bay, Delaware Bay and the Atlantic Coast. EPCAMR, Conservation Partners and PA Agencies, by 10/2022

- Create ArcGIS Online (AGOL) Story Map and Final Recommendation Report with uploaded photos, survey results, locations of EPCAMR prioritized projects based on sediment reduction and removal, streambank stabilization, riparian restoration, culvert assessments, wildlife habitat improvement projects for the American black duck, and Eastern brook trout species. Visual Story Boards will be placed in Libraries and offered to be presented within the 3 School Districts in the targeted watersheds. EPCAMR, TU, by 9/2022

The objective of this document is to identify the quality assurance components that are necessary to implement the project activities under the **Wyoming Valley Chesapeake Bay Tributary Field Assessments and Monitoring (PA)**. This objective will be achieved by using methods in our EPCAMR Field Monitoring Binder Version 3 in Appendix C also known as our Standard Operating Procedure (SOP) including:

- U.S. Environmental Protection Agency (US EPA) Rapid Bioassessment protocols for physical (i.e.: Temperature) / chemical (i.e.: pH, D.O., ORP, Conductivity, Turbidity, Alkalinity, Sulfates, Iron, Aluminum, Phosphates, and Nitrate concentrations) / aquatic macroinvertebrate (AM) sampling indices (i.e. Diversity and EPT Taxa Richness),
- U.S. Geological Survey (USGS) Discharge Measurements at Gauging Stations Techniques and Methods for flow monitoring,
- U.S. Natural Resources Conservation Service (NRCS) Stream Visual Assessment Protocol (SVAP) for instream/near stream habitat scoring,
- North Atlantic Aquatic Connectivity Collaborative (NAACC) Aquatic Organism Passability (AOP) scoring of Stream Crossing Assessment protocols for stream continuity, and
- U.S. Fish and Wildlife Service (US FWS) Classification of Wetlands and Deepwater Habitats to identify Waterbody ID classifications.

Required monitoring or measurements will generally begin during the timeframe for the collection of the data in the Spring, Summer, and Fall of 2021/2022 during baseflow conditions in the watersheds that are within the project area for safety reasons and due to many of our protocols calling for collecting data during typical low flow conditions. Table 1 lists the constituents that are required to be monitored. A map of the project sites is found in Appendix A.

Table 1 Constituents to be monitored

CONSTITUENT	UNIT	CONSTITUENT	UNIT(S)
Flow (stream only)	CFS (Ft^3/Sec)	Iron	mg/L
Temperature	^{0}F or ^{0}C	Aluminum	mg/L
pH	pH units	Phosphates	mg/L
Dissolved Oxygen	mg/L	Nitrates	mg/L
Redox (ORP)	mV	Waterbody ID	classification
Conductivity	µs/cm	SVAP Habitat Score (stream only)	numerical
Turbidity	FTU	AOP Score (stream only)	numerical
Alkalinity	mg/L	Aquatic Macroinvertebrate (AM) Diversity	types/total
Sulfates	mg/L	AM EPT Taxa Richness	%EPT

1.3 DATA QUALITY OBJECTIVES

Monitoring constituents in Table 1 will be collected once at each site to determine comparable quantitative and qualitative analyses between sites. SVAP and AOP scores will only be calculated for stream sites. Sampling sites will be selected in both mining impaired land/water regions and unimpaired regions (representative reaches) in each watershed. Collected data will inform the selection/implementation of habitat improvement projects based on local examples of good habitat as well as traditional habitat criteria for American Black Duck, and Eastern Brook Trout. For example, Eastern Brook Trout prefer cold water (less than 70 F), dissolved oxygen above 6 mg/L, and pH between 4.5-7.5 as per the PA Fish and Boat Commission "Pond and Stream Study Guide" Publication. Stream reaches outside of those criteria will be considered for potential habitat improvement projects.

Our environmental scientist, John Levitsky, identified over 100 water bodies as potential Black Duck Habitat from aerial photography in Appendix A and knowledge of PA Fish and Boat Commission and PA Game Commission banding sites within these watersheds. Landowner permission was not gained at the time. We will sample several types of wetland/lake habitats to make up a representative sample of habitats available to Black Duck in the watersheds.

Site selection of streams monitoring locations for Eastern Brook Trout Habitat are probabilistic or random sampling regime as done in EPA's Rapid Bio Assessment protocol. Generally, EPCAMR selects sites upstream of the stream and major tributary confluences, on the tributary and with one additional sampling at the mouth of the stream. Please see the EPCAMR Field Monitoring Binder Version 3 Section 2: Chemistry Monitoring Protocols for more detail. While the diagram in this referenced SOP refers to a "suspect discharge point," sampling streams in general follow the same basic method. EPCAMR will not specifically be concentrating on monitoring mine drainage (AMD) to streams in these watersheds, but several streams in these watersheds are impaired with AMD as the source.

These sampling events conducted in this grant project are one-time sampling events to establish a baseline to compare existing sampling data compiled in our bibliography literature research mentioned in the Work Plan in Section 1.2. Site prioritization will be determined by accessibility (i.e. landowner permission) and to make a representative sample of the types of wetlands and streams already meeting habitat criteria and those needing improvement (i.e. future projects).

The data quality assurance objectives are listed in Table 2.

Table 2 Quality Assurance Objectives for Individual Measurements

Parameter	Method	Detection Limit	Sensitivity	Accuracy	Completeness
Flow	USGS Midsection Method	0.1 to 25 f/s velocity	0.01 CFS	±3%	100%
Temperature	Thermometric	–5 to 70 °C	0.1 °C	±0.2 °C	100%
Temperature (continuous)	Thermometric, Fixed interval logging	–20° to 70°C	0.01°C	±0.2 °C	100%
pH	Ion selective electrode	0 to 14 su	0.01 su	±0.2 su	100%
Dissolved Oxygen (DO)	Electrochemical DO sensor	0 to 50 mg/L	0.01 mg/L	±0.2 mg/L	100%
Redox (ORP)	Platinum button	–1999 to +1999 mV	0.1 mV	±20 mV	100%
Conductivity	Electrode cell	0 to 3999 µS/cm	1 µS/cm	±2%	100%

Turbidity	ISO7027	5 to 400 FTU	1 FTU	±1%	100%
Alkalinity	Buffer/Indicator	0 to 500 mg/l	1 mg/L	±1%	100%
Iron	Thioglycollate	0 to 100 mg/L w/ dilution	0.01 mg/L	±1%	100%
Aluminum	Eriochrome Cyanine R	0 to 5 mg/l w/ dilution	0.01 mg/L	±1%	100%
Sulfates	Barium Chloride	0 to 200 mg/L	0.01 mg/L	±1%	100%
Phosphates	Vandomolybdate	0 to 100 mg/L	0.01 mg/L	±1%	100%
Nitrates	Reduction/Diazotization	0 to 20 mg/l	0.01 mg/L	±1%	100%
Waterbody ID	US FWS Cowardin et al	NA	NA	NA	100%
SVAP Score	NRCS SVA Protocol	12 to 240 (streams only)	1	NA	100%
AOP Score	NAACC AOP Protocol	0 to 1 (streams only)	0.01	NA	100%
AM Diversity	EPA Rapid Bio. Assmt.	1 to 100%	1%	NA	100%
AM %EPT	EPA Rapid Bio. Assmt.	1 to 100%	1%	NA	100%

Individual parameter method details are available in the EPCAMR Field Monitoring Binder Version 3 which can be found in Appendix C and summaries are provided below for convenience.

Flow is calculated with the USGS Midsection Method (Turnipseed 2010). Depth and velocity measurements are entered into our Swoffer 3000 flow meter attached to a 4/10 wading rod at consistent intervals along a tape stretched across the stream perpendicular to positive flow direction. Once all stations are entered, the flow meter calculates a flow in cubic feet per second. We calculate to gallons per minute with a conversion factor as needed (see EPCAMR Field Binder Section 3 Page 3-4 for details).

Water Chemistry is taken at both wetland and stream sites to identify the ability to support aquatic life. Concentrations are multiplied by flow to calculate pollutant loadings. (see EPCAMR Field Binder Section 2 Page 1 for details).

Water temperature, pH, dissolved oxygen, redox (ORP) are field sampled at the time of water sample collection with our YSI Pro Plus meter as per the manual (YSI 2009) or YSI Pro Quatro as per the manual (YSI 2002). EPCAMR calibrates the meter at least monthly and even more often when we are using the devices more often. They are sent in for regular maintenance bi-annually. (see EPCAMR Field Binder Section 2 Page 2 for details).

Alkalinity, Iron, Aluminum, and Sulfates are field sampled at the time of water sample collection with our YSI 9500 Photometer as per the manual (YSI 2010). The photometer is rugged, durable and IP-67 rated yet lightweight and portable for field or laboratory use. Individual tests include the use of reagents added to 10 ml of sample water which is compared through wavelength analysis against a blank sample of the same water. A 10 ml pump and pipette is used to measure sample volumes and reduce human error. Metals samples (Iron and Aluminum) are

diluted to 10X when needed as per the manual to extend the detection limits (see EPCAMR Field Binder Section 2 Page 3-4 for details).

Phosphates, and Nitrates are also sampled at the time of sample collection with our YSI 9500 Photometer as per the manual (YSI 2010). Prior to Chesapeake Bay Phase 3 Watershed Implementation Plan sampling in northeastern PA counties, it was commonly thought that nutrients were only constituents of surface water, however sampling of mine water from underground sources began to show significant quantities of nutrients. Many studies have been conducted to show that nutrients and mine drainage can be co-treated, therefore future sampling by EPCAMR will include nutrient sampling (Hughes 2012, Strosnider 2011c, Younger 2014)

Turbidity is also sampled at the time of water sample collection with our YSI 9500 Photometer as per the manual (YSI 2010). No reagents are used, but the blank is filtered by running sample through a 0.45 micron filter using a syringe and compared to the sample. Turbidity is used to estimate Total Suspended Solids (TSS) at a ratio of 3:1.

Conductivity is field sampled at the time of water sample collection with our HANNA EC/TDS Stick Meter (HANNA 2005) and water temperature is compared to the YSI meter. Redox (ORP) sampled with a similar HANNA Stick Meter and is compared to YSI meter. Probes on these meters are replaced bi-annually. Conductivity is used to estimate Total Dissolved Solids (TDS) at a ratio of 2:1.

Metals acidity is calculated from pH, alkalinity and metals concentrations as per the formula published in the Journal of the International Mine Water Association (Hedin 2006)

Waterbody Identification (ID) are field determined for wetlands (palustrine and lacustrine) and streams (riverine). The Classification of Wetlands and Deepwater Habitats of the United States Chart is used to select attributes of the waterbody and produce an alphanumeric code (Cowardin 1979).

Stream Visual Assessment Protocol (SVAP) Score ranks the stream habitat on 12 criteria as per Natural Resource Conservation Service (NRCS) Stream Visual Assessment Protocol (USDA NRCS 1998). The length of the assessment reach is considered to be 10 to 12 times the active channel width. Parameters of the stream section are measured in the field and fed into a matrix to determine the score (see EPCAMR Field Binder Section 4A for details).

Aquatic Organism Passage (AOP) Score ranks a stream crossing with 13 criteria as per North Atlantic Aquatic Connectivity Collective (NAACC) AOP Protocol (Abbott 2019). Parameters of the crossing are measured in the field and fed into a matrix to determine the score (see EPCAMR Field Binder Section 4B for details). Those constituent parameters and associated weighted are: Outlet drop 0.161 Physical barriers 0.135, Constriction 0.090, Inlet grade 0.088, Water depth 0.082, Water velocity 0.080 Scour pool 0.071, Substrate matches stream 0.070, Substrate coverage 0.057, Openness 0.052, Height 0.045, Outlet armoring 0.037, and Internal structures 0.032.

Aquatic Macroinvertebrates (AM) are field sampled with the “kicking method” also know as Single Stream Habitat Approach uses a 1 Meter 500 micron, mesh Kick Net as per EPA Rapid Bioassessment Protocol for stream habitats or Dip Net Measured Sweep Method adapted from Maine DEP Protocols for Sampling Aquatic Macroinvertebrates in Freshwater Wetlands: (see EPCAMR Field Binder Section 5 Page 1-2 for details). The “picking method” follows to clean the net of visible macroinvertebrates which are segregated in trays and identified to order level. If family, genus and/or species can be determined with confidence these are counted as different types. Quantities are tallied to determine abundance. Once an order reaches 50 individuals it is noted (A) abundant, more than 5 individuals and up to 49 in an order are noted (C) common and

less than 5 individuals in an order are noted (R) rare. (see EPCAMR Field Binder Section 5 Page 4-5 for details).

Aquatic Macroinvertebrates (AM) Diversity is an index that divides number of taxa (different types identified to the family level) by the total number of individuals in the sample to yield a percentage which represents relative diversity. A low percentage represents lower diversity and less variability in food choices for ABD and EBT

Aquatic Macroinvertebrate (AM) Percent Ephemeroptera, Plecoptera, and Trichoptera (%EPT) is the number of EPT individuals divided by the total number of individuals in the sample. The total number of taxa within the "pollution sensitive" orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). These macroinvertebrate orders are the least tolerant of organic pollution with Hilsenhoff Biotic Index (HBI) scores from 0-4. Taxa richness and EPT taxa richness will decrease with decreasing water quality (Weber, 1973).

In select sites where continuous temperature is measured, HOBO TidbiT Temp 400 Data Logging temperature sensors will be deployed to measure at 15-minute intervals. The sensors will be installed in strategic points in each of the watersheds to determine transition zones for coldwater and warmwater fisheries associated with Brook Trout Habitat. Data will be downloaded quarterly via Bluetooth using the HOBOconnect application.

EPCAMR follows all manufacturer recommended procedures referenced in Section 8 when using field equipment. If we see a parameter that is outside the expected value based on experience, we recollect it as a real-time QA/QC in the field. The main operator of the chemistry equipment in the field has laboratory experience prior to their time at EPCAMR.

1.4 DOCUMENTATION AND RECORDS

EPCAMR staff are trained on methods as specified in the EPCAMR Field Monitoring Binder Version 3

All records generated by this project will be stored at EPCAMR main office. Copies of this QAPP will be distributed to all parties involved with the project, including signatories and field sampling personnel. Any future changes or amendments to the QAPP will be held and distributed in the same fashion. Copies of previous versions of the QAPP will be clearly marked as "superseded by Revision #" so as not to create confusion.

At least 3 digital photos are taken at each site (of the site, upstream & downstream with people for scale) & site sketch to depict in-stream reach to articulate attributes like riffles, fallen trees, pools and in wetlands especially to show when more than one waterbody ID type is present. The geotag of the photo is used to verify sampling location. Photos are used to confirm wetland vegetation and waterbody ID by Environmental Scientist, John Levitsky of the Luzerne Conservation District. Photos and Field Sampling Datasheets are organized in folders by site on our Google Cloud Drive for EPCAMR team review and many will become part of the publicly accessible AGOL Story map. Quantitative and some Qualitative sampling results will be transferred to a spreadsheet format for display in the final report.

The records of all project information and data used to complete the activities of the project will be retained for at least seven years from the date of report completion.

2 DATA ACQUISITION/SURVEY INPUT

2.1 SAMPLING INFORMATION

Information on sample locations can be found in Appendix A. Methods for sample collection in the field will be done according to standard procedures mentioned in Section 1.3 above and detailed in EPCAMR Field Monitoring Binder Version 3. EPCAMR staff will be supervised by either Robert Hughes, EPCAMR Executive Director or Michael Hewitt, EPCAMR Program Manager to ensure proper sampling techniques will be used and a representative sample is collected.

2.2 Sample Storage, Preservation and Holding Times

EPCAMR will not be preserving or storing samples. Samples will be taken directly on site in the field and not sent to a laboratory for analyses.

SAMPLE IDENTIFICATION

All samples will be directly recorded on the Field Sampling Datasheet for that particular site with the following information.

- Sample ID
- Location ID
- Date
- Time
- Initials of sample collector

QC SAMPLE COLLECTION

Equipment blanks and field duplicates are not done. When a tested parameter is out of expected range (based on 20+ years of experience in sampling in the Southern Wyoming Valley Watersheds) EPCAMR staff will re-run the sample as a real-time quality control (QC) step. Sample results are compared to EPCAMR's database of previously sampled results (not part of this grant project work) for a particular stream reach. If the sample is still determined to be unacceptable, we will mark it as such in field notes and recalibrate the instrument.

FIELD INSTRUMENT CALIBRATION

Routine field instrument calibration will be performed on YSI Pro and HANNA probes at least monthly and even more often when we are using the devices more often to ensure instruments are operating properly and producing accurate and reliable data (see table 2). Calibration Logs are kept in our field notebooks. Probes are replaced as recommended by the manufacturer referenced in Section 8 or are sent in for regular maintenance bi-annually.

DECONTAMINATION PROCEDURES

EPCAMR does not sample for hazardous chemicals which would need strict decontamination procedures. Field sampling device parts which touch water are rinsed three times with sample water prior to collecting each sample. Field sampling equipment parts that do not touch the water are generally wiped down with a dampened cloth after each day of use and before storage. Glass tubes placed in the YSI Photometer are rinsed with distilled water after each sample and field glassware is routinely cleaned with Citra Jet to remove accumulated residue, rinsed completely with tap water, a final rinse with distilled water, and let to air-dry. All other field equipment is cleaned per manufacturer recommendations referenced in Section 8.

FIELD DOCUMENTATION

All field activities will be adequately and consistently documented especially for seasonal variability to ensure defensibility of any data used for decision-making and to support data interpretation. EPCAMR will take photos upstream, downstream and at the site which also helps determine geographic location and aides in plant/animal identification, see Section 1.4 for additional information on Photo Documentation.

Pertinent field information, including (as applicable) samplers initials, the date/time, ambient temperature, current/past weather, location, HUC watershed address, and other physical conditions listed in Section 5 of the EPA's Rapid Bioassessment protocols will be recorded on the field sheets.

EPCAMR recognizes that holding times for pH, Temperature, and Dissolved Oxygen are 15 minutes. These parameters are sampled with a YSI probe which shows instantaneous results. Other parameters are sampled based on manufacturer recommendations referenced in Section 8.

2.3 SAMPLE CUSTODY AND DOCUMENTATION

EPCAMR will not be preserving or storing samples. Samples will be taken directly on site and not sent to a laboratory for analyses. Chain of custody procedures are not needed.

DOCUMENTATION PROCEDURES

The primary field sampler will be responsible for ensuring that the field sampling team adheres to proper documentation procedures. Field Sampling Datasheets and site photos will be returned to primary field sampler or uploaded directly to the Google Cloud Drive for review. Quantitative and some qualitative sampling results will be transferred to a spreadsheet format for display in the final report. Field Sampling Datasheets can be found in Appendix B.

3 ANALYTICAL REQUIREMENTS

EPCAMR will assess American Black Duck and Eastern Brook Trout habitat following our standard operating procedures (SOP) detailed in EPCAMR Field Monitoring Binder Version 3 and procedures mentioned in Section 1.3 above.

No laboratory analysis will be done on samples. All samples will be performed in the field.

4 QUALITY CONTROL REQUIREMENTS

The types of quality control assessments required for this project are defined in Table 2 to determine that the data collected in the field is accurate and appropriate for this project. Summarized standard operating procedures (SOP) detailed in EPCAMR Field Monitoring Binder Version 3 and procedures mentioned in Section 1.3 above.

4.1 QUALITY ASSURANCE OBJECTIVE (QAO) CRITERIA

The QAOs define a tolerable level of potential decision error for data collected on a project. They help to define the data quality objectives and clarify the project objectives further. The QAOs are then used as comparison criteria during data quality review by the group that is responsible for collecting data to determine if the minimum requirements have been met and the data may be used as planned. QAOs for this project are determined by accuracy of field instrumentation. EPCAMR staff complete required information on the Field Sampling Datasheet when conducting a site assessment in the field for both American Black Duck and Eastern Brook Trout habitats. The primary field sampler will check completeness of the datasheet in the office and fill in the appropriate data. Information is also reviewed for accuracy by and Environmental Scientist, John Levitsky of the Luzerne Conservation District.

4.2 MEASUREMENT PERFORMANCE CRITERIA

The overall QA objective for this project is to develop and implement procedures for field sampling, and reporting that will provide results that are scientifically defensible. Specific procedures for sampling, reporting of data, internal QC, audits, preventive maintenance of field equipment, and corrective action are described in the other sections of this QAPP

4.2.1 FIELD PRECISION

Field precision is discussed in Section 2.2 QC SAMPLE COLLECTION. We follow all equipment manufacturer recommendations referenced in Section 8.

4.2.2 FIELD ACCURACY

Field accuracy is discussed in Table 2 and Section 1.3. We follow all equipment manufacturer recommendations referenced in Section 8. (ADD: Field accuracy will be maintained through the use of identified SOPs and Guidance documents as well as trained and experienced staff.)

4.3 INTERNAL QUALITY CONTROL

Internal QC is achieved by calibrating instrumentation regularly with standard solutions provided by the manufacturer referenced in Section 8. Duplicate, blank, spike, and spike duplicate samples are not analyzed. Other procedures to maintain internal quality control are discussed in Sections 2.2 and 1.3.

4.4 FIELD QUALITY CONTROL

Procedures to maintain field quality control and are discussed in Sections 2.2 and 1.3.

5 INSTRUMENTATION AND EQUIPMENT PREVENTIVE MAINTENANCE

5.1 SAMPLE EQUIPMENT CLEANING PROCEDURES

Equipment used for sample collection (ADD: on this project will include (LIST EQUIPMENT). All equipment will be cleaned and maintained in accordance with proper field practices spelled out in Section 2.2 DECONTAMINATION PROCEDURES.

5.2 ANALYTICAL INSTRUMENT AND EQUIPMENT TESTING PROCEDURES AND CORRECTIVE ACTIONS

All field instrument and equipment testing will be performed according to manufacturer recommendations and spelled out in Section 2.2 FIELD INSTRUMENT CALIBRATION. EPCAMR will be frequently calibrating equipment and noting the calibration events. Equipment found to be out of calibration will be removed from use until it can be recalibrated and is determined to be operating within manufacturer specifications.

5.3 INSTRUMENT CALIBRATIONS AND FREQUENCY

All field instrument and equipment testing will be performed according to manufacturer recommendations referenced in Section 8 and spelled out in Section 2.2 FIELD INSTRUMENT CALIBRATION.

6 DATA MANAGEMENT

Copies of field logs (Field Sampling Datasheets) and notes will be kept for review by the primary field sampler. The EPCAMR staff will retain original field logs after they have been recorded in tabular format for the final project report.

Field data sheets are checked by the project manager & QA specialist. They will verify sample identification information is incorrect, identify any results that may be unacceptable, samples that were inappropriately handled, or calibration information is missing or inadequate. Please refer to Section 2.2 for correct procedures. Such data will be marked as unacceptable, and questions sent to the primary field sampler. If the data in question cannot be resolved, the data will not be entered into the electronic database and/or otherwise used for project analysis, reporting or other purpose.

Concentrations of chemicals, physical parameters, and all numerical biological parameters will be calculated as described in the referenced method document for each analyte or parameter. The data is placed in a spreadsheet (MS Excel or Google Sheets) and will be QA/QC checked and maintained on EPCAMR computers or cloud services. This review for QA/QC purposes is to produce the data tables that will be used in the final report. All project information will remain confidential until finalized. See Section 6.2 for additional information on this data reporting requirement.

After data entry or data transfer procedures are completed for each sample event, data will be inspected for data transcription errors, and corrected as appropriate. After the final QA checks for errors are completed, the data will be added to the final database.

6.1 DATA ASSESSMENT PROCEDURES

Data must be consistently assessed and documented to determine whether project QAOs have been met, quantitatively assess data quality, and identify potential limitations on data use. Assessment and compliance with quality control procedures will be undertaken during the data collection phase of the project.

6.2 DATA TO BE INCLUDED IN QA SUMMARY REPORTS

During the project, NFWF may require periodic reporting, as noted below.

The following table summarizes the types of data to be reported to NFWF staff.

Data	Data Description	Reporting Method	Frequency
Monitoring Data	Raw data on project effectiveness, ambient water quality in priority watershed, stormwater flow, project conclusion data, etc.	Raw data, reports, and/or spreadsheets submitted through NFWF online system through the Final Programmatic Report.	At NFWF Request during the closeout procedure
Geospatial Data	Google polygon maps, latitude/longitude info, watershed segment	Uploaded via NFWF online system map page	At NFWF Request at application, during any Map Update Tasks, and during the closeout procedure

At project completion, the field team will provide copies of the field data sheets (relevant pages of field logs) as a representative sample subset submittal of analysis. At a minimum, sample-specific information must be provided for each sampling type to NFWF staff according to the QA Summary Report template, included as Appendix D.

6.3 REPORTING FORMAT

All results meeting data quality objectives and results having satisfactory explanations for deviations from objectives will be reported in the QA Summary Report. The final results will include the results of all field quality control samples. Results will be reported to NFWF at project completion as noted in Section 6.2 above. Reports may be submitted electronically along with the final programmatic report.

7 DATA VALIDATION AND USABILITY

7.1 Self-Assessment, Data System Audits

Periodic self-assessments and/or data system audits are implemented based on the nature and scope of project-specific data collection activities. For data users, these technical audits and assessments provide project personnel with a tool to determine whether data collection activities are being or have been implemented as planned. They also provide the basis for taking action to correct any deficiencies that are discovered. For QAPP Categories 1-2, NFWF may request periodic self-assessments or a data system audit. For QAPP Categories 3-4, NFWF requires the implementation of one of these tools. The decision is made by the project manager and based on the frequency of project-specific data activities.

8 REFERENCES

Abbott, A. and S. D. Jackson. 2019. NAACC Stream Crossing Instruction Manual for Aquatic Passability Assessments in Non-tidal Stream and Rivers. North Atlantic Aquatic Connectivity Collaborative (NAACC), University of Massachusetts Amherst. June 2, 2019. 33 pp. https://streamcontinuity.org/sites/streamcontinuity.org/files/pdf-doc-ppt/NAACC%20Aquatic%20Passability%20Scoring%206-16-16.pdf

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Cowardin et al. 1979. Classification of wetlands and deepwater habitats of the United States. Washington, D.C., Fish and Wildlife Service, U.S. Dept. of the Interior. https://www.nrc.gov/docs/ML1801/ML18019A904.pdf

EPCAMR 2021. Abandoned Mine Drainage Stream Monitoring Field Binder Version 3. http://www.epcamr.org/storage/projects/FIELDBINDER.pdf

HANNA 2005. HI 98311 & HI 98312 Waterproof EC/TDS/Temperature Testers Manual https://www.hannainst.com/hubfs/product-manuals/manhi_98311_98312.pdf?hsLang=en

Harlan H. Bengtson, Phd, P.E. 2011. Spreadsheet Use For Partially Full Pipe Flow Calculations

Hedin, R.S. 2006. The Use of Measured and Calculated Acidity Values to Improve the Quality of Mine Drainage Datasets. Mine Water Environ 25, 146–152 . https://doi.org/10.1007/s10230-006-0126-2

Hughes, T.A., Gray, N.F. 2012. Co-treatment of acid mine drainage with municipal wastewater: performance evaluation. Environ Sci Pollut Res 20, 7863–7877 https://doi.org/10.1007/s11356-012-1303-4

Open Channel Flow Website 2021. https://www.openchannelflow.com/blog/tag/weir

Shull, D. R., and J. Lookenbill (editors). 2018. Water Quality Monitoring Protocols for Rivers and Streams. Pennsylvania Department of Environmental Protection Office of Water Programs Bureau of Clean Water, Harrisburg, Pennsylvania

Stream Restoration Inc. 2007. Datashed Passive Treatment System O&M Inspection Methods

Strosnider W.H., Winfrey B.K., Nairn R.W. 2011c. Novel passive co-treatment of acid mine drainage and municipal wastewater. J Environ Qual 40:206–213 https://doi.org/10.2134/jeq2010.0176

Turnipseed, D.P., and Sauer, V.B., 2010, Discharge Measurements at Gaging Stations: U.S. Geological Survey Techniques and Methods Book 3, Chap. A8, 87 p. (3-A8)

USDA NRCS 1998. Stream Visual Assessment Protocol (SVAP) NWCC Technical Note 99-1

Weber, C.I. 1973. Biological Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents. US Environmental Protection Agency, Environmental Monitoring Series, Washington DC.

WV DEP 2009. Save Our Streams Standard Operating Procedures
https://dep.wv.gov/WWE/getinvolved/sos/Pages/default.aspx

Younger, P.L. and R. Henderson. 2014. Synergistic wetland treatment of sewage and mine water: Pollutant removal performance of the first full-scale system, Water Research, Volume 55, pp 74-82,ISSN 0043-1354, https://doi.org/10.1016/j.watres.2014.02.024

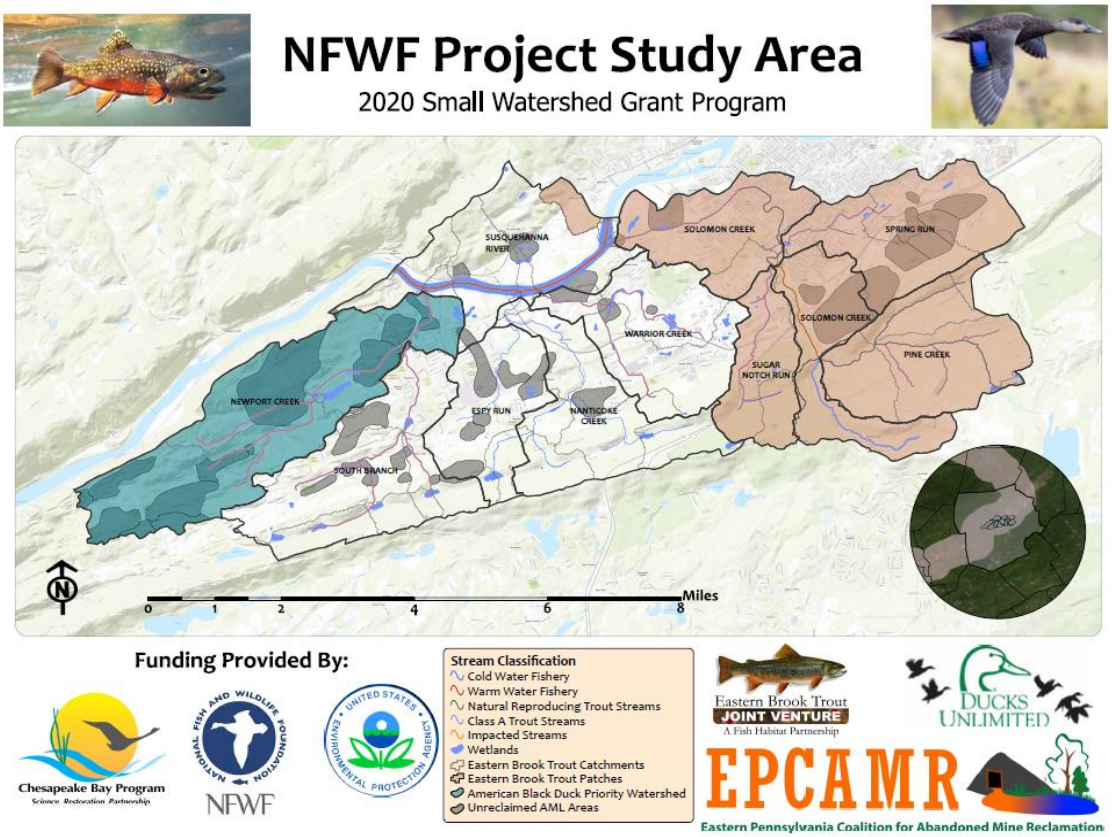
YSI 2009. Professional Plus User Manual Revision D
https://www.ysi.com/File%20Library/Documents/Manuals/605596-YSI-ProPlus-User-Manual-RevD.pdf

YSI 2010. 9300 and 9500 Direct-read Photometers User Manual
https://www.ysi.com/File%20Library/Documents/Manuals/YPT282-9300-9500-manual-with-test-procedures.pdf
YSI 2020. Professional Quatro User Manual Revision C
https://www.ysi.com/File%20Library/Documents/Manuals/606962-ProQuatro-User-Manual-English.pdf

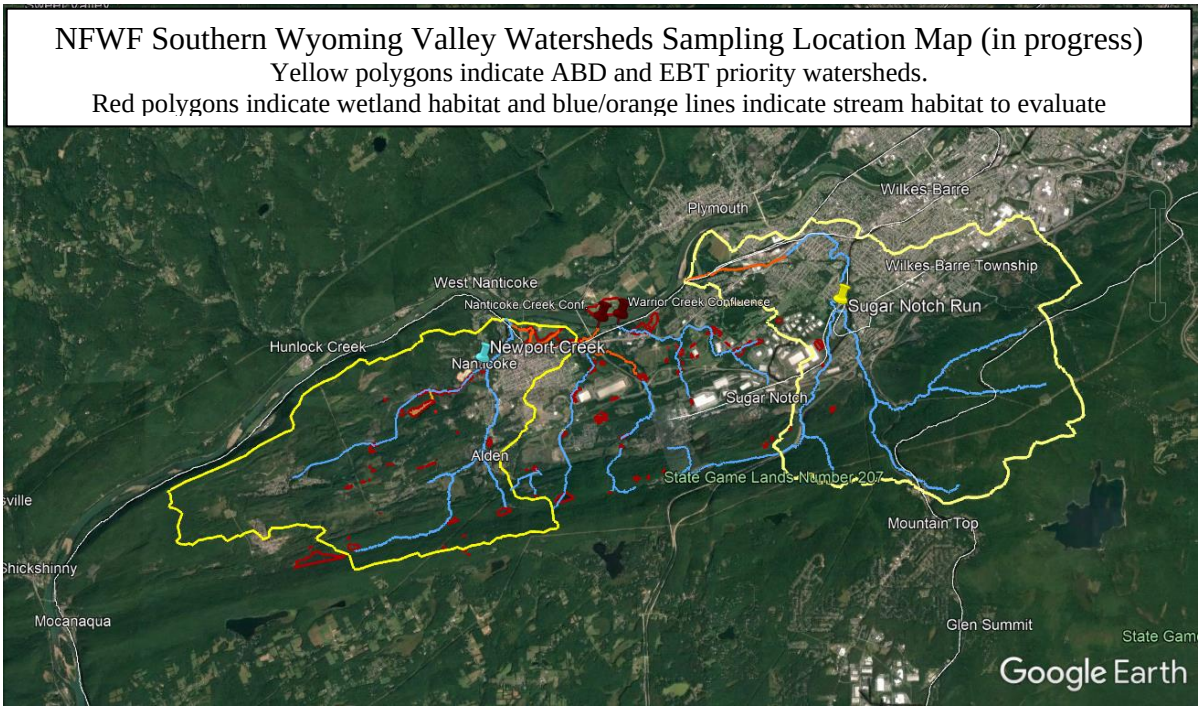
Appendices

A) Project Site Maps
B) Field Sampling Datasheets
C) Standard Operating Procedures (EPCAMR Field Monitoring Binder V 3)
D) QA Summary Report At Project Close Out

APPENDIX A – PROJECT SITE MAPS



NFWF Southern Wyoming Valley Watersheds Sampling Location Map (in progress)
Yellow polygons indicate ABD and EBT priority watersheds.
Red polygons indicate wetland habitat and blue/orange lines indicate stream habitat to evaluate



APPENDIX B – FIELD SAMPLING DATASHEETS

Station Information (adapted from PA DEP Bureau of Water Standards Form 3800-FM-WSFR0086 Rev. 12/2008)

Date-Time-Initials: _____-_____-_____ Station ID: _____

Location (ex. Latitude/Longitude, directions, landmarks…): _____

_____

County: _____ Municipality: _____ Topo Quad: _____

Watershed (HUC8): _____ Stream (HUC12): _____ Tributary (HUC14): _____

Waterbody Class*: _____ Ch. 93 Use¥: _____ Weather - Current: _____ - Past Week: _____

*Riverine, Lacustrine, Palustrine or Non-classified manmade ¥Warm Water Fish, Trout Stock Fish, Cold Water Fish, Migratory Fish, High Quality, or Exceptional Value.

Reminder to take (3) photos (of site, upstream & downstream with people for scale) & sketch site (in-stream attributes like riffles, fallen trees, pools, etc.)

Physical Conditions (circle one or more): (adapted from WV SOS Level 1 Survey 18373 Rev. 11/2009 and EPA Rapid Bioassessment 841-B-99-002)

Water Clarity: *clear, murky, milky, muddy, other* Water Color: *none, brown, black, green, gray /white, orange/red*

Streambed Color: *brown, black, green, white/gray, orange/red* Surface Foam/Oil: *none, slight, moderate, high*

Water Odor: *none, fishy, musky, sewage, chemical, rotten egg* Algae Abundance: *none, scattered, moderate, heavy*

Algae Growth Habit: *even coating, hairy, matted, floating* Algae Color: *light green, dark green, brown, other*

Field Chemistry	Result/Unit		Result/Unit	Describe Type	Result/Unit
Temperature:		Total Alkalinity:		Metals:	
Dissolved Oxygen:		Conductivity:		Nutrients:	
pH:		Turbidity:		Redox (ORP):	

Additional tests (describe and record results): _____

_____

Flow Calculation (adapted from WV SOS Level one Survey Datasheet 18373 Rev. 11/2009) Channel Width/Pipe Diameter(ft): _____

Method Used (circle one): *flow meter, float, pipe, velocity head rod (VHR)*

Tape distance (ft)	Depth (ft)	X Velocity (ft/sec)	or Float (sec)	or VHR (Rise-in.)	= Discharge (CFS)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Totals/Averages					

VHR Values Chart

Rise	Velocity	Rise	Velocity
¼"	1.2 f/s	3 ¼"	4.2 f/s
½"	1.6 f/s	3 ½"	4.3 f/s
¾"	2.0 f/s	3 ¾"	4.5 f/s
1"	2.3 f/s	4"	4.6 f/s
1 ¼"	2.6 f/s	4 ¼"	4.8 f/s
1 ½"	2.8 f/s	4 ½"	4.9 f/s
1 ¾"	3.1 f/s	4 ¾"	5.0 f/s
2"	3.3 f/s	5"	5.2 f/s
2 ¼"	3.5 f/s	5 ¼"	5.3 f/s
2 ½"	3.7 f/s	5 ½"	5.4 f/s
2 ¾"	3.8 f/s	5 ¾"	5.5 f/s
3"	4.0 f/s	6"	5.7 f/s

Basic Calculation: Discharge (CFS)= Width (ft) x Depth(ft) x Velocity (ft/sec.)

If you use the "float method" record your float distance here _____ (ft) and multiply by the time (recorded above) to get velocity.

If you use the "VHR method" record the rise in inches and select velocity in the chart to the right. 1 CFS = 448.83 gpm = 1.858 MGD

Part 2	Optimal	Suboptimal	Marginal	Poor
7. Frequency of Riffles	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
8. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
9. Condition of Banks	Banks stable; no evidence of erosion or bank failure.	Moderately stable; infrequent, small areas of erosion mostly healed over.	Moderately unstable; up to 60% of banks in reach have areas of erosion.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; on side slopes,60-100% of bank has erosional scars.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the stream-bank surface covered by vegetation.	50-70% of the stream-bank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**

Total Part 2 _____

Total Score _____ If < 140 for forested, cold water & high gradient (<120 for warm water low gradient), then generally impaired

Impairment Thresholds

#3 Embeddedness + #6 Sediment Deposition: _____ If < 24 (<20 for warm water low gradient), then impaired by sediment

#9 Condition of Banks + #10 Bank Vegetation: _____ If < 24 (<20 for warm water low gradient), then impaired by bank erosion

Land Use

Residential: _____% Commercial: _____% Industrial: _____%

Cropland: _____% Pasture: _____% Abd. Mining: _____%

Old Fields: _____% Forest: _____% Other: _____%

(circle one)

Canopy cover: open partly shaded mostly shaded fully shaded

Dominant bank veg. species 1st: _____

2nd: _____ 3rd: _____

Habitat comments: _____

Part 2	Optimal	Suboptimal	Marginal	Poor
7. Frequency of Riffles	Occurrence of riffles relatively frequent; distance between riffles divided by the width of the stream equals 5 to 7; variety of habitat.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream equals 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is between ratio >25.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
8. Channel Flow Status	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
9. Condition of Banks	Banks stable; no evidence of erosion or bank failure.	Moderately stable; infrequent, small areas of erosion mostly healed over.	Moderately unstable; up to 60% of banks in reach have areas of erosion.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; on side slopes,60-100% of bank has erosional scars.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
10. Bank Vegetative Protection	More than 90% of the streambank surface covered by vegetation.	70-90% of the stream-bank surface covered by vegetation.	50-70% of the stream-bank surfaces covered by vegetation.	Less than 50% of the streambank surface covered by vegetation.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
11. Grazing or Other Disruptive Pressure	Vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.	Disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	Disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Disruption of vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**
12. Riparian Vegetative Zone Width	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE _____	**20 19 18 17 16**	**15 14 13 12 11**	**10 9 8 7 6**	**5 4 3 2 1**

Total Part 2 _____

Total Score _____ If < 140 for forested, cold water & high gradient (<120 for warm water low gradient), then generally impaired

Impairment Thresholds

#3 Embeddedness + #6 Sediment Deposition: _____ If < 24 (<20 for warm water low gradient), then impaired by sediment

#9 Condition of Banks + #10 Bank Vegetation: _____ If < 24 (<20 for warm water low gradient), then impaired by bank erosion

Land Use

Residential: _____% Commercial: _____% Industrial: _____%

Cropland: _____% Pasture: _____% Abd. Mining: _____%

Old Fields: _____% Forest: _____% Other: _____%

(circle one)

Canopy cover: open partly shaded mostly shaded fully shaded

Dominant bank veg. species 1st: _____

2nd: _____ 3rd: _____

Habitat comments: _____

Section 1A: Stream Quality & Quantity Field Sampling Datasheets (Updated 1/2021)

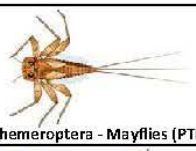
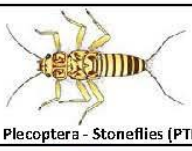
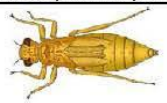
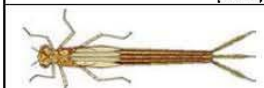
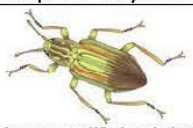
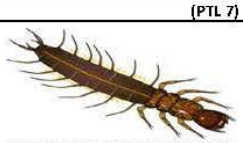
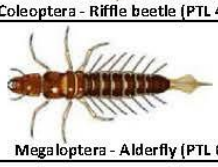
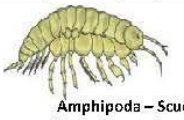
Benthic Macro-invertebrates (adapted from WV SOS Level One Survey Datasheet 18373)

1 2 3 4 5 6 7 8 9 10

after name indicates Pollution Tolerance Level (PTL): Low (1) to High (10). Use the dot dash tally method. >

Record: **Abundance** - (A) > 50, (C) 5 – 50 and (R) < 5 and **# of kinds -** indicates groups where multiple kinds (families) are possible

Sampling Method Used? (circle one): Std. Kick Screen, D-Frame Net, Surber Sampler, Other (Illustrations by Cacapon Institute)

 Ephemeroptera - Mayflies (PTL 3)	# of kinds	 Plecoptera - Stoneflies (PTL 2)	# of kinds	 Trichoptera -Caddisflies (PTL 3) - rock or stick case builders	# of kinds
 Odonata Anisoptera - Dragonflies (PTL 4)	# of kinds	 Trichoptera - Caddisflies (PTL 5) – net-spinners "hairy abdomen"		 Trichoptera - Caddisflies (PTL 4) - free living	# of kinds
 Odonata Zygoptera - Damselflies (PTL 7)	# of kinds	 Coleoptera - Riffle beetle (PTL 4)		 Coleoptera - Water penny (PTL 3)	
 Megaloptera - Dobsonfly (PTL 3)		 Megaloptera - Alderfly (PTL 6)		 Heteroptera – True bugs (PTL 7)	# of kinds
 Diptera Chronomidae - Rat-Tailed Maggots & Midges (PTL 8)		 Diptera - Crane fly (PTL 4)		 Cladocera -Water fleas (PTL 6)	
 Diptera - Watersnipe fly (PTL 3)		 Diptera - Other flies, Mosquito larvae, Black fly (PTL 6)	# of kinds	 Decapoda - Crayfish (PTL 5)	# of kinds
 Bivalva Veneroida - Clams (PTL 6)	# of kinds	 Mytiloida - Mussel (PTL 4)		 Amphipoda – Scud / Side-swimmer (PTL 5)	
 Gastorpada - Gilled or Operculate snails (PTL 5) - have lid	# of kinds	 Gastropada – Lunged or Non-operculate snails (PTL 7) - no lid	# of kinds	 Isopoda - Aquatic sowbug (PTL 7)	
 Oligacheta -Aquatic worm (PTL 10)		 Hirudinea - Leech (PTL 10)		 Planaridae - Flatworm (PTL 7)	

Totals: # Macros: _____ # EPT: _____ %EPT: _____ # of Taxa (kinds): _____ Date: _____ Station ID: _____

APPENDIX C – STANDARD OPERATING PROCEDURES (EPCAMR FIELD MONITORING BINDER VERSION 3 – 170 PAGES)

In an attempt to reduce paperwork and save natural resources, please download an electronic copy of our 170 page EPCAMR Field Monitoring Binder Version 3 from our website.

APPENDIX D – QA SUMMARY REPORT AT PROJECT CLOSE OUT

"Wyoming Valley Chesapeake Bay Tributary Field Assessments and Monitoring (PA)" NFWF ID # 69485

QA Summary Report - Components

This project resulted in

Work Plan Deliverables: Anticipated to begin in Spring 2021 and end in Fall of 2022

- Conduct literature search of any available projects, existing plans, assessments, fishery reports or plans, mining related reports and monitoring of the priority watersheds, TMDLs, and compile the resources as references and or to establish baseline and historic conditions of the watersheds. EPCAMR, 10/2022- Appendix of Resources, Reports, and Plans
- Work with local government officials and neighbors to identify and contact private landowners to determine if they would allow for access to streamside areas to survey conditions that might become eligible as future candidates for implementation projects with their permission and potential grant funding. EPCAMR, Local Governments, October thru 6/2022. ArcGIS Pro Online Integrated Story Map and Final Recommendation Report will include possible project area locations and landowner identification
- Train EPCAMR staff in specific assessment field via the EPCAMR Field Monitoring Binder Version 3 to identify and measure habitat areas for the American Black Duck, and Eastern Brook Trout. EPCAMR, 3-10/2020- Database of EPCAMR Staff who become trained in field assessments
- Conduct field assessments Supervised by the Newport Creek, Nanticoke Creek, Warrior Creek, Solomon Creek in the Southern Wyoming Valley. EPCAMR, Data will be provided in the Recommendation Report and Online Story Map. 3-10/2021 and again in 3-10/ 2022
- Research American Black Duck species, habitat, migratory paths, holdover areas, and seek information from local wildlife and conservation agencies like the PA Game Commission, Luzerne Conservation District, NCC, NBLT, and DU. Target area is positioned in the Atlantic Flyway as a critical connection point for waterfowl and links species between Canadian breeding and wintering grounds, between Lake Erie, Chesapeake Bay, Delaware Bay and the Atlantic Coast. EPCAMR, Conservation Partners and PA Agencies. 3/2021-10/2021
- Create ArcGIS Online (AGOL) Story Map and Final Recommendation Report with uploaded photos, survey results, locations of EPCAMR prioritized projects based on sediment reduction and removal, streambank stabilization, riparian restoration, culvert assessments, wildlife habitat improvement projects for the American black duck, and Eastern brook trout species. Visual Story Boards will be placed in Libraries and offered to be presented within the 3 School Districts in the targeted watersheds. EPCAMR, TU. 8-9/2022

This work product received the required nature and scope of QAPP oversight appropriate for the intended use of the data.

The data sets, data products and other supporting QA documentation is/are maintained on file with the assigned research staff as noted in the QAPP until [**10/31/2028**]**.**

All QAPP elements were met and completed according to the procedures and methods outlined therein.

NFWF QA Summary Reports will be submitted to NFWF annually and at project completion as requested. The QA Summary reports will include the following information, as appropriate –

1. QA Summary Closeout reports include the extent to which projects are implemented according to the stated scope of work and the methodologies specified in this QAPP in their final programmatic reports.
2. Significant changes to the objective, scope, or methodology of environmental data collection or use of environmental technology require the review and approval of the NFWF Program Manager and the NFWF QA reviewer. Therefore, if needed, appropriate revisions to this QAPP will be completed and submitted to the NFWF Program Manager for review and approval prior to implementation of changes.
3. Additionally, periodic QA Summary Reports will be submitted to NFWF annually, if requested, according to the table, below.

The following table summarizes the types of data to be reported and the method in which that information will be delivered to NFWF staff.

Data	Data Description	Reporting Method	Frequency
Monitoring Data	Raw data on project effectiveness, ambient water quality in priority watershed, stormwater flow, project conclusion data, etc.	Raw data, reports, and/or spreadsheets submitted through NFWF online system through the Final Programmatic Report.	At NFWF Request during the closeout procedure
Geospatial Data	Google polygon maps, latitude/longitude info, watershed segment	Uploaded via NFWF online system map page	At NFWF Request at application, during any Map Update Tasks, and during the closeout procedure