

	<p>Multi-habitat (MHAB) Macroinvertebrate Collection Procedure B-011-OWQ-WAP-XXX-23-T-R1 Technical Standard Operating Procedure Office: Office of Water Quality Branch: Watershed Assessment and Planning Branch Section: All</p> <p>Last Revised: February 28, 2023 Revision Cycle: Every 4 years Originally Effective: October 30, 2010</p>
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Purpose

This technical standard operating procedure (TSOP) describes the method for collecting benthic macroinvertebrate communities through a multi-habitat (MHAB) collection procedure using a D-frame dipnet. Specifically, this TSOP covers the processes of:

- Preparation for sample collection
- Sample collection method
- Sample preservation
- Completion of associated datasheets and chain of custody
- Sample delivery

Macroinvertebrate samples are collected during low flow, from July 15 to November 15. The macroinvertebrate samples are processed and identified in the Indiana Department of Environmental Management (IDEM) laboratory located at 2525 North Shadeland Avenue, Indianapolis, Indiana (Shadeland). Macroinvertebrates are bioindicators, facilitating the “[Weight of Evidence](#)” approach to interpretation of biomonitoring results as recommended by the U.S. Environmental Protection Agency (U.S. EPA).

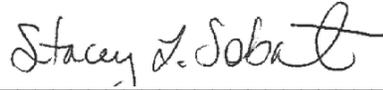
Scope

This TSOP applies to agency staff in the IDEM Office of Water Quality (OWQ), Watershed Assessment and Planning Branch (WAPB) responsible for collecting macroinvertebrate community samples from rivers and streams.

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Authorizing Signatures

I approve and authorize this technical standard operating procedure:



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3/14/2023

Date



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3/14/2023

Date

This technical standard operating procedure is consistent with agency requirements.



Quality Assurance Staff
IDEM Office of Program Support

3/23/2023

Date

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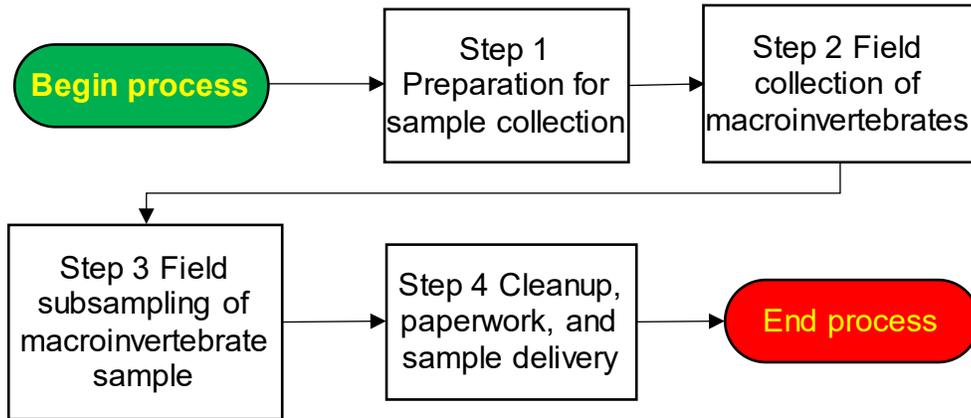
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1.0. Overview Flowchart



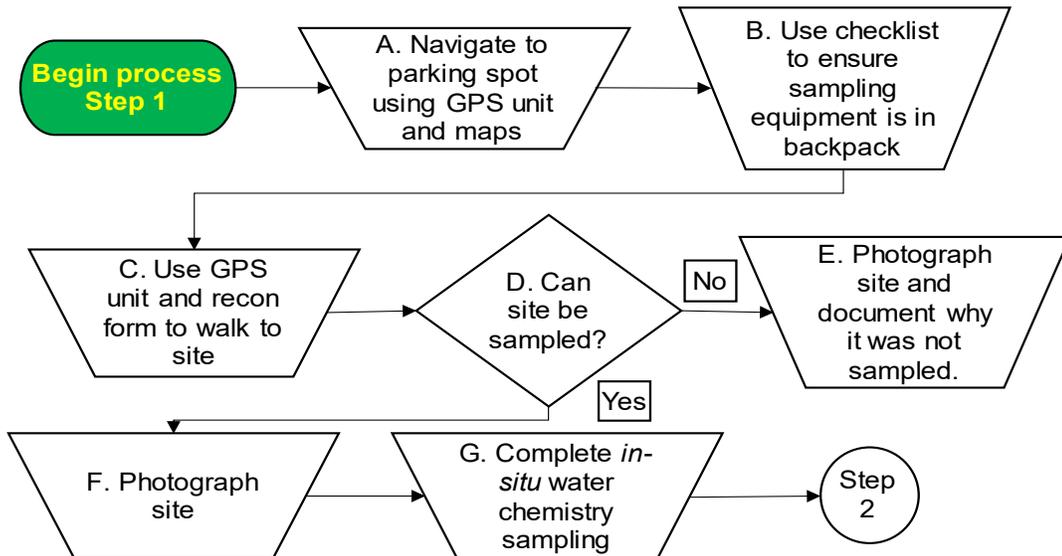
2.0. Procedure

2.1. Procedural Flowchart

Step 1–4 procedural flowcharts are shown in Section 2.2, followed by the step-by-step description.

2.2. Procedural Steps

Step 1. Preparation for sample collection



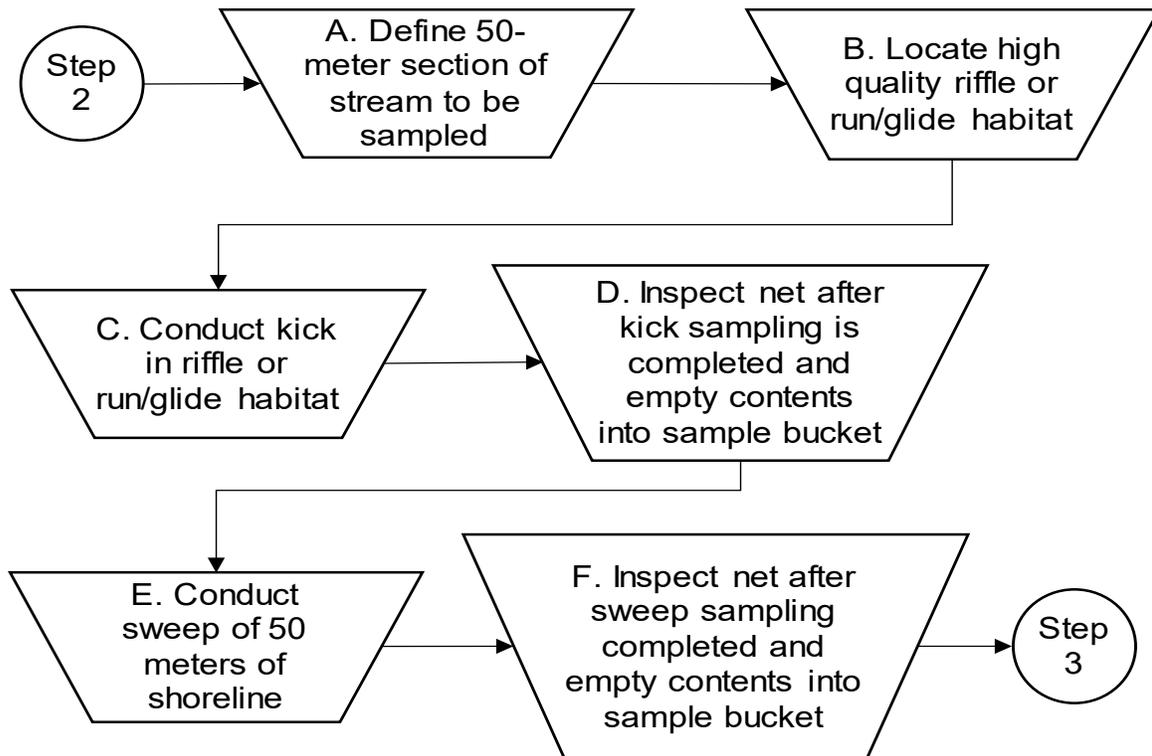
A. The field crew drives to the designated parking spot, as described on the Site Reconnaissance Form (Appendix 9.3),

using a combination of the Indiana Atlas & Gazetteer, aerial maps (Appendix 9.1), topographic maps (Appendix 9.2), and a handheld global positioning system (GPS) unit.

- B. The crew chief:
 1. Affixes the appropriate site folder, containing the Stream Sampling Field Data Sheet (Appendix 9.4); Qualitative Habitat Evaluation Index (QHEI) (Appendix 9.5); Site Reconnaissance Form (Appendix 9.3); and site maps, to the clipboard.
 2. Affixes the Scientific Purpose License; Photographic Image Chain of Custody (Appendix 9.6); and OWQ Chain of Custody (Appendix 9.7) to the clipboard.
 3. Using the Multi-habitat (MHAB) Macroinvertebrate Sampling Checklist (Appendix 9.8), ensures all the equipment necessary to conduct macroinvertebrate sampling is present and stored in the backpack for transportation to the sampling site.
- C. Using the handheld GPS unit and the Site Reconnaissance Form, the crew chief and field crew proceed to the sampling site with the clipboard, backpacks, and any other equipment required to complete the sampling.
- D. Upon arrival at the sampling site, the crew chief determines if the site can be sampled. In order to be sampled, water must be present in 50% of the stream reach (e.g., 25-30 meters). In addition to water being present in 50% of the reach, if flow is greatly reduced, as seen in higher gradient streams, there must be interstitial flow between substrate that connects pools. If the site cannot be sampled, proceed to Step 1.E. If the site can be sampled, proceed to Step 1.F.
- E. If the site cannot be sampled:
 1. The crew chief completes the following portions of the Stream Sampling Field Data Sheet:
 - a. Sample Collectors
 - b. Date
 - c. Time
 - d. Check one of the following boxes under “Sample Taken?”:
 - i. Stream Dry
 - ii. Owner Refused Access
 - iii. Frozen

- iv. Other (Describe the reason the sample could not be collected in the “Special Notes” area of the Stream Sampling Field Data Sheet).
- e. Take digital photographs to illustrate why the site was rejected, using a digital handheld camera or field phone camera. The photograph is labeled with a three-digit U.S. EPA site identification number; the reason for rejection (e.g., dry, frozen, etc.); initials of the photographer; and date as MMDDYY (i.e., 001 DRY MCO 061522) on the Photographic Image Chain of Custody. No photograph is necessary when reason for rejection is “owner refused access”. The photographs’ metadata will be recorded on the Photographic Image Chain of Custody.
 2. Make an entry for the site in the field notebook (Appendix 9.9) with the reason the site was not sampled.
 3. The crew chief and field crew return to the vehicle. If time allows travel to the next site and repeat the process starting with Step 1.A.
- F. If the site can be sampled:
 1. The field crew takes digital photographs of upstream and downstream stream reaches and the sampling area, using a digital handheld camera or field phone camera. The photograph is labeled with a three-digit U.S. EPA site identification number; the direction of flow, upstream (US) or downstream (DS); initials of the photographer; and date as MMDDYY (i.e., 001 US MCO 061522) on the Photographic Image Chain of Custody.
 2. The photographs’ metadata are recorded on the Photographic Image Chain of Custody.
 3. Abnormalities that may be affecting water quality such as algal blooms, dead fish, or modifications to the bank or stream are photographed and noted in the “Special Notes” area of the Stream Sampling Field Data Sheet.
- G. Prior to the field collection of macroinvertebrates, *in-situ* water chemistry parameters are measured with a data sonde and a water sample for turbidity is collected (IDEM 2020). This information is recorded on the Stream Sampling Field Data Sheet.

Step 2. Field collection of macroinvertebrates



- A. The crew chief may designate a member of the field crew to collect and subsample the macroinvertebrate sample. The designated field crew must be qualified, through training or experience, to lead a crew on their own.
1. The sample collector defines a stream reach of 50 meters upstream and 50 meters downstream of the sampling point, using a tape measure or rangefinder.
 2. Within the 100-meter reach, the sample collector visually surveys the instream and surrounding riparian habitat on both shores of the stream reach.
 3. Using best professional judgment, the sample collector measures a 50-meter section of stream habitat potentially yielding the most diverse macroinvertebrate sample. The most productive habitat types in a stream are root wads, woody debris, and riffle-run-pool complexes.
 4. Note: Avoid collecting samples within 100 meters of bridges or including major adjoining tributaries within the sample reach, if possible (Barbour et al. 1999).

- B. The sample collector selects the highest quality, wadeable riffle within the 50-meter stream reach. If a riffle is not:
- Present within this reach, then a riffle located no more than 15 times the stream's wetted width (to a maximum of 500 meters) from the sample point may be sampled.
 - Available within 15 times the stream's wetted width, locate the highest quality wadeable run or glide habitat within this section of the stream.
- C. The sample collector:
1. Places the D-frame dipnet into the water at the base of the riffle, or the downstream area of the riffle/run habitat. The flat end of the D-frame dipnet must be placed securely onto the substrate so there are no gaps under the frame.
 2. Disturbs (by kicking) the riffle/run substrate 0.3 meters (e.g., 1 foot) directly in front of the D-frame dipnet causing the stream's current to carry any dislodged macroinvertebrates into the net.
 3. Moves upstream through the riffle/run for 3.3 meters (e.g., 10 feet), continuously disturbing the substrate in front of the D-frame dipnet. The process provides a sample roughly equivalent to one square meter of riffle/run habitat.
 4. The sample collector disturbs the stream substrate and sweeps the D-frame dipnet through the water column above the substrate to collect dislodged macroinvertebrates.
 5. The riffle/run kick portion of the MHAB sample is timed and should be completed in 60 seconds.
- D. The sample collector:
1. Inspects the contents of the D-frame dipnet after the riffle/run kick is completed. Cobble and large sticks are visually inspected with any attached macroinvertebrates returned to the net. The debris items are discarded. Any freshwater mussels (Unionidae) should be removed from the D-frame dipnet and carefully replaced in the stream.
 2. Empties the riffle/run kick sample from the D-frame dipnet into a 10-liter plastic bucket half-filled with ambient water.
- E. The sample collector:
1. Begins the 50-meter sweep sample at the downstream end of the selected stream reach.

2. Using best professional judgement, samples all available habitats (rootwads, emergent vegetation, woody debris, depositional zones with coarse particulate matter, leaf packs, sandy and silty substrates, and cobble and gravel substrates) in relative proportion to their occurrence in the 50-meter stream reach.
3. Sweeps the D-frame net over and into the habitat so that macroinvertebrates are dislodged into the water column.
4. Then sweeps the D-frame dipnet through the water column above the disturbed habitat two or three times to collect the dislodged macroinvertebrates.
5. Conducts about 20 to 25 sweeps at roughly 2- to 2.5-meter intervals for the entire length of the 50-meter stream reach.

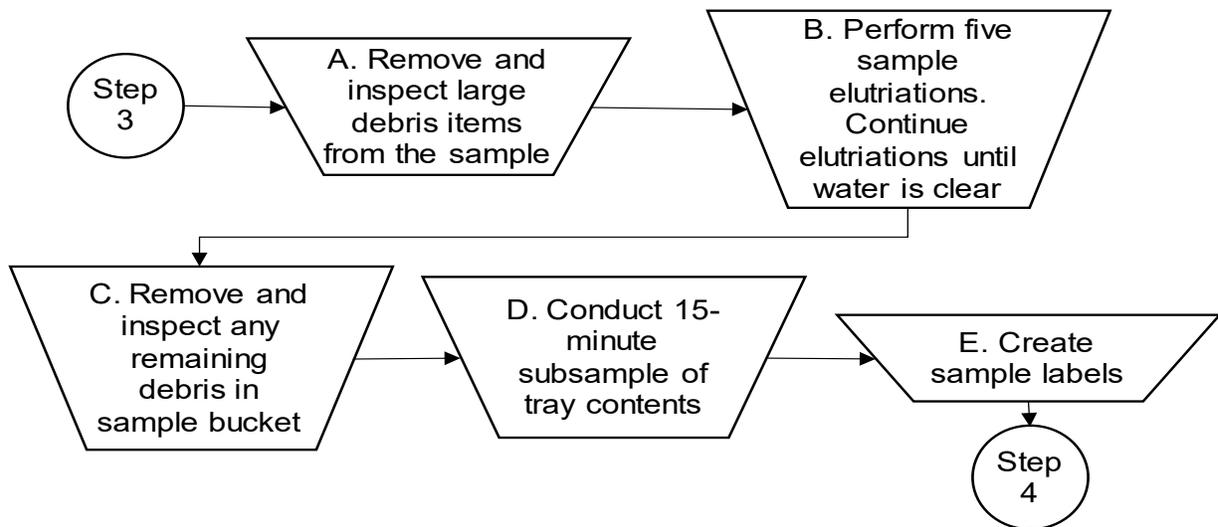
F. The sample collector:

1. Inspects the contents of the net after the sweep sample is completed. Cobble and large sticks are visually inspected with any attached macroinvertebrates returned to the net. The debris items are then discarded.

Note: Any freshwater mussels (Unionidae) should be removed from the net and carefully replaced in the stream.

2. Empties the sweep sample contents from the D-frame net into the 10-liter plastic bucket in which the riffle/run kick sample was deposited.

Step 2. Field Subsampling of Macroinvertebrate Sample

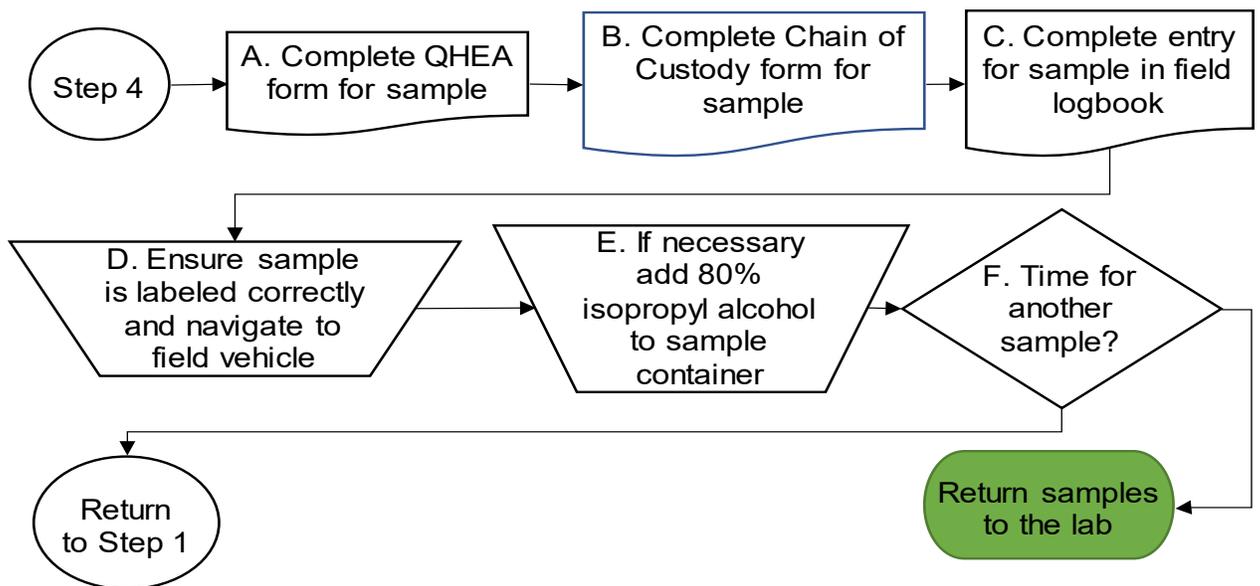


A. The sample collector:

1. Removes and visually inspects any cobble, large gravel, woody debris, or large leaves that are in the 10-liter plastic sample bucket.
 2. Uses forceps to remove macroinvertebrates and place them into the white plastic tray.
 3. Pulls apart any large clumps of filamentous algae to dislodge any attached macroinvertebrates.
 4. Discards the debris items, after inspection.
- B. The sample collector:
1. Agitates the sample bucket contents by hand.
 2. Pours the water through a U.S. Standard No. 35 sieve, stopping before any sand is poured into the sieve.
 3. Empties the sieve contents into the white plastic tray after each pour.
 4. Uses a separate 10-liter bucket to refill the sample bucket with ambient water that is free of macroinvertebrates.
 5. Repeats elutriations a minimum of five times.
 6. Continues elutriating until the water pouring through the sieve is clear and free of silt.
- C. The sample collector:
1. Removes and visually inspects any remaining sand, leaves, or fine gravel in the sample bucket.
 2. Uses forceps to remove macroinvertebrates and places them into the white plastic tray.
 3. Debris items are discarded, after inspection.
- D. The sample collector:
1. Uses forceps to individually pick macroinvertebrates from the white plastic tray depositing them into a 250 ml sample container prefilled with 80% isopropyl alcohol.
 2. A second 250 ml sample container is used for larger macroinvertebrates such as crayfish or dobsonflies (Megaloptera), if they are numerous in the sample.
 3. Picks macroinvertebrates from the white sample tray for 15 minutes, which may be timed by the crew chief or a member of the field crew, using a timing device.
 4. Attempts to collect a macroinvertebrate subsample with the greatest potential diversity of macroinvertebrate taxa reflecting the relative abundance of macroinvertebrates in the entire sample.
- E. The sample collector:

1. Creates sample labels from Rite in the Rain paper.
2. Inserts a label into each 250 ml sample container. Sample labels are written using a lead pencil and include:
 - a. Stream name
 - b. AIMS sample number
 - c. Macroinvertebrate sample number
 - d. EPA Site ID number
 - e. Date
 - f. Sample collector's initials
 - g. Any other pertinent information.
3. The same information is written on a piece of white label tape affixed to the top of each 250 ml sample container using a Sharpie or other permanent pen. "1 of 2" and "2 of 2" are also included on the sample container labels, if multiple containers were used for the sample (see Step 3.D.).

Step 3. Cleanup, paperwork, and sample delivery



- A. The sample collector completes the QHEI form for the site. See IDEM 2023 for instructions on how to fill out the QHEI form.
- B. The crew chief completes the OWQ chain of custody including the following:
 1. Macroinvertebrate sample number

2. AIMS sample number (e.g., AA#####, AB#####, AC#####, etc.)
 3. Number of sample containers
 4. Date and time the sample was collected.
- C. The crew chief fills out an entry in the field notebook containing the following:
1. The same information found on the sample labels.
 2. If a riffle/run kick portion of the sample was collected.
 3. The area of the stream where the 50-meter sweep sample was collected relative to the sample point.
 4. Any other pertinent information such as modifications made to the sample method or the presence and species (if known) of any freshwater mussels (Unionidae) encountered.
- D. The crew chief checks to ensure that all macroinvertebrate samples are properly labeled, all site forms are completed, and all sampling equipment is stored in the backpacks. The crew chief and field crew leave the site and navigate to field vehicle's parking location.
- Crew members will decontaminate field equipment using a 3% bleach solution following each sampling run or between sampling sites any time:
1. Equipment is being used in a different 8-digit Hydrologic Unit Code (HUC).
 2. Viruses (e.g., viral hemorrhagic septicemia (VHS)) have been detected in the area.
- Crew members will decontaminate field equipment using only a 3% bleach solution following each sampling run or between sampling sites any time when entering Indiana Department of Natural Resources interested lands or National Parks.
- E. Upon arrival at the field vehicle, the crew chief adds additional 80% isopropyl alcohol to the macroinvertebrate sample containers, depending on the amount of organic material in the sample container.
- F. The crew chief determines if there is sufficient time remaining to complete another macroinvertebrate sample.
1. If there is sufficient time remaining, return to Step 1 to repeat the process.
 2. If there is not sufficient time in the day to collect another macroinvertebrate sample or all macroinvertebrate

samples for the project have been collected, the crew chief and field crew will return to their field lodgings or to the IDEM Shadeland office.

2.3. Related Technical Issues

A. Health and Safety Warnings

1. Safety issues are the responsibility of all crew members; however, any questions in the field should be directed to the crew chief. The crew chief is responsible for the completion of all work listed in the TSOP, the health and safety aspects of the sampling event, and successful interactions with landowners and members of the public.
 - a. Sampling will be postponed, if the stream flow is dangerous for staff to enter, any hazardous weather conditions exist, or unexpected physical barriers prevent access to the site. Unexpected physical barriers could include an impassable log jam, fence, or physical installations; and domestic and wildlife dangers. Flow is considered dangerous at flood stages, so staff will use best professional judgement following or during a high-water event. Staff will use current USGS website (<https://waterwatch.usgs.gov/?m=real&r=in&w=map>) water data, daily streamflow condition readings to determine whether the discharge rate is elevated too far from median flow to sample. Typically, streamflow discharge in the 75th percentile or greater would be considered too high to sample. Since stream gage stations are not on all streams and rivers, especially headwater streams, staff may travel to sites and use best professional judgement to determine whether sample collection at the site will occur.
2. Due to the remoteness of the sampling sites and the possibility of a medical emergency, all field staff are required to complete basic first aid and cardiopulmonary resuscitation training.
3. New hires or those changing job responsibilities, without the minimum four-hour training, must be accompanied in the field by a staff member who has met the requirements of the branch health and safety training. According to the memorandum "Change in status of Water Assessment Branch staff in accordance with the Agency training policy" dated November 29, 2010, OWQ WAPB staff are exempt from initial and annual training requirements set forth in Section 6.0 of IDEM Health and Safety Training Policy (IDEM 2010). The memorandum also states, "as an alternative to

the training requirements of the policy, the Branch will conduct in-service training at a minimum of four hours per year on topics directly related to duties performed by staff.”

4. Due to the remoteness of sampling sites and the possibility of a medical emergency, sampling on surface waters requires increased safety consciousness of staff members. The use of specialized equipment is also required. Thus, staff will comply with the IDEM Personal Protective Equipment (PPE) Policy (IDEM 2008). If an injury or illness arises in the field, staff will follow the IDEM Injury and/or Illness Resulting from Occupational Exposure Policy (IDEM 2016).
5. To prevent drowning during sample collection, personnel will wear appropriate clothing and PPE when operating boats or sampling in deep water or swift currents. According to the memorandum “Use of Personal Flotation Devices (PFDs) by Branch Personnel” dated February 29, 2000, staff must wear U.S. Coast Guard approved Type I, II, or III PFDs whenever:
 - a. Planned work requires them to enter the water and the maximum water depth at any place at the work site is over their knee. Note that this depth depends on the staff, but it will usually be between 12 to 20 inches or 300 to 500 mm.
 - b. Staff is in a watercraft of any kind that is being launched, is in the water, or is being retrieved from the water.
 - c. Staff must work from structures that do not possess guard rails and are over or alongside water where the water depth is, or could reasonably be expected to be, 3 feet or more.
6. Additional requirements to prevent drowning are required, when work is being done in boats on boundary waters as defined by Indiana Code IC-14-8-2-27 or between sunset and sunrise on any waters of the state. All personnel in the watercraft must wear a high intensity whistle and Safety of Life at Sea (SOLAS) certified strobe light.
7. Field personnel collecting *in-situ* water chemistry measurements and macroinvertebrate MHAB samples will follow policies and procedures in the Water Chemistry Field Sampling Procedures (IDEM 2020), the IDEM Hazard Communication (HazCom) Plan (IDEM 2019), and Office of Water Quality Watershed Assessment and Planning Branch Laboratory Safety Plan (IDEM 2021).

8. Before using isopropyl alcohol, review the Safety Data Sheet (SDS, Fisher Scientific, 2003) stored in the macroinvertebrate laboratory in the IDEM Shadeland office and be sure to wear required PPE.
 - a. Isopropyl alcohol poses the following health hazards:
 - i. Combustible liquid
 - ii. Harmful to eyes, skin, and internal organs. Suspected of causing genetic defects
 - iii. May cause cancer (International Agency for Research on Cancer Group 1 carcinogen)
 - iv. Harmful to aquatic life
 - b. Required PPE:
 - i. Chemical resistant latex or nitrile gloves
 - ii. Protective eyewear (safety glasses or goggles)
 - iii. Face shield
9. Per recommendations of the IDEM Health and Safety office (IDEM 2010), when heat index temperatures reach 100°F, field work should be reduced to a 50% work /50% rest schedule. Heat index temperatures above 105°F require suspension of field work, until heat index temperatures decrease to below 105°F.
10. Due to the hazards presented by thorns, nettles, poison ivy, contaminants in the water, and from abrasions that may result from boulders and logs in the stream, all field crew members should wear chest or hip waders when conducting field sampling activities.
11. Bleach hazards and safety:
 - a. Review the appropriate SDS before working with bleach and use appropriate PPE (safety glasses and gloves).
 - b. 1:32 dilution (bleach:water) for 3% solution using 6% concentration of household bleach.
 - c. Vapor may cause severe irritation or damage to eyes and skin.
 - d. Harmful if swallowed.
 - e. Corrodes metals.
 - f. Will fade colors and break down cloth fibers.
 - g. If in an opaque container, diluted bleach will last 1 month.
 - h. If exposed to sunlight or air, it will only last 5 days.
 - i. Keep out of lakes, streams, or ponds; stand at least 50 meters from any natural water source.

B. Cautions

1. The collection of large amounts of organic debris or sand in the D-frame dipnet bag should be avoided as it will slow down the elutriation and picking process.
2. Tears or holes in the D-frame dipnet bag may allow macroinvertebrates to escape, potentially biasing the results. Inspect the D-frame dipnet bag for tears or holes after each sample has been collected. Immediately repair any small tears with a strong suturing material (such as fishing line) or replace the entire net bag if the holes are numerous or large.
3. Always ensure that the sample identification numbers are recorded correctly and match on all sample labels, forms, and field notebook entries.
4. Failure to adequately preserve the sample may result in degradation of the organisms. Sample containers should be filled to at least two-thirds full of 80% isopropyl alcohol prior to the addition of any specimens. Samples containing a large amount of organic material, snails, non-unionid freshwater mussels (Cyrenidae, Sphaeriidae Dreissenidae), or crayfish will require the use of a second container specifically for the larger organisms. Preservative may also need to be replaced upon return to the laboratory and prior to long-term storage.

C. Interferences

1. Heavy rains (more than one inch) may scour the stream substrate and remove many macroinvertebrates or force them to take refuge deeper in the substrate. If a sample is collected immediately after the rain event, poor quality sample will result. A minimum period of two weeks after a potential scouring event should be allowed for natural macroinvertebrate recolonization.
2. Organisms should be removed from the tray singly, if possible, during the 15-minute pick to avoid “scooping” of multiple organisms and potential bias of sample results.
3. Streams where the channel is reduced to interstitial flow between a series of pools; streams with a deep U- or bowl-shaped channel; and larger nonwadable rivers may not provide habitat which will result in a representative sample from collection of a 1-minute kick sample. In these instances, the sample will only consist of a 50-meter sweep of all available habitat.

4. If the predetermined sample point is located on a section of the stream that is currently dry or inaccessible, then the sample point may be moved to an accessible section of the stream containing water, if the new section is within 15 times the average wetted width of the stream from the location of the original sample point. Adjusting the sample point should only be done if the resulting sample location provides similar habitat to what would have been at the actual point. The rationale for such modification and the area of the stream sampled should be described in the field notebook and on the site drawing in the QHEI.

D. Calibration

- Not applicable.

E. Troubleshooting

- Not applicable.

3.0 Roles

3.1. Responsibilities

A. Crew chief

1. Completes macroinvertebrate MHAB sampling training.
2. Completes *in-situ* water chemistry measurements training.
3. Completes boat safety and operation training.
4. Prepares for sample collection.
5. Collects macroinvertebrates in the field.
6. Subsamples macroinvertebrates in the field.
7. Completes QHEI form.
8. Reviews all field datasheets and chain of custody forms.
9. Transfers MHAB samples to lab custodian.

B. Field crew members

1. Complete macroinvertebrate MHAB sampling training.
2. Complete *in-situ* water chemistry measurements training.
3. Complete boat safety and operation training.
4. Prepare for sample collection.
5. Collect macroinvertebrates in the field.
6. Subsample macroinvertebrates in the field.
7. Complete QHEI form.
8. Collect and record *in-situ* water chemistry measurements.
9. Complete field datasheets and chain-of-custody forms.

C. Lab custodian

1. Receives the macroinvertebrate MHAB samples from the crew chief.
2. Places samples in storage in IDEM Shadeland macroinvertebrate laboratory (Room 125).

3.2. Training requirements

- A. Preparation for sample collection
 1. Crew chief
 2. Field crew
- B. Field collection of macroinvertebrates
 1. Crew chief
 2. Field crew
- C. Field subsampling of macroinvertebrates
 1. Crew chief
 2. Field crew
- D. Completion of QHEI form
 1. Crew chief
 2. Field crew
- E. *In-situ* water chemistry measurements
 1. Crew chief
 2. Field crew
- F. Boat safety and operation training
 1. Crew chief
 2. Field crew

4.0 Required Forms, Equipment, or Software List

4.1. Forms

- A. Site Reconnaissance Form
- B. Stream Sampling Field Data Sheet
- C. OWQ Biological QHEI (Qualitative Habitat Evaluation Index)
- D. Original Photographic Image Chain of Custody
- E. OWQ Chain of Custody Form
- F. Field notebook
- G. First Report of Injury Form
- H. Scientific Collectors Permit

4.2. Equipment

- A. D-frame dipnet with 500 micrometer mesh
- B. 2.5-gallon buckets (x2)
- C. U.S. Standard No. 35 (500 micrometer) sieve
- D. White sorting tray approximately 18" x 24"
- E. Forceps, preferably #4A type
- F. Timing device (e.g., kitchen timer or wristwatch)
- G. Field notebook
- H. Label paper
- I. Pencils and sharpener
- J. Fine-point Sharpie pens
- K. Clipboard
- L. Backpack
- M. Rangefinder
- N. 50-meter tape measure
- O. Global Positioning Satellite (GPS) unit
- P. Chest or hip waders and boots
- Q. U.S. Coast Guard approved Type I, II or III PFD with high intensity whistle
- R. Hach turbidimeter 2100P
- S. Turbidity vial
- T. Data sonde
- U. Spherical densiometer
- V. First aid kit
- W. Chemical resistant latex or nitrile gloves
- X. Protective eyewear (safety glasses or goggles)
- Y. Face shield

Fluids

- A. Eye wash solution

- B. Nalgene HDPE plastic 250 ml jars prefilled with 70-80% isopropyl alcohol.
- C. SDS for isopropyl alcohol
- D. 3% bleach solution
- E. SDS for bleach solution

Additional Equipment when Boating

- A. U.S. Coast Guard approved Type IV-Throwable for Boating
- B. High intensity whistle
- C. Safety of Life at Sea certified strobe light
- D. Boat box with key, safety lanyard, flashlight, tools, etc.
- E. Gas can for boat motor
- F. Fire extinguisher
- G. Paddles
- H. Rope
- I. Carabiners
- J. Canoe
- K. Canoe racks or foam blocks
- L. Canoe tie downs
- M. Canoe lock (overnights only)
- N. Boat box
- O. Fubbel
- P. 2-inch ball hitch
- Q. Padlock and key
- R. Boat Pouch

4.3. Software

- A. Assessment Information Management System database (AIMS database)

5.0 Records Management

5.1. Site Reconnaissance Form

- A. The original hard copy is kept in the site folder and stored in a file cabinet in the WAPB library at the IDEM Shadeland office. A copy is made for crew chief and field crew to navigate to the sampling location.
 - B. Information recorded on the Site Reconnaissance Form is entered into the AIMS database.
 - C. The original hard copy is retained until it is scanned and uploaded to AIMS database or the Virtual File Cabinet (VFC), after which it will be recycled.
- 5.2. Stream Sampling Field Data Sheet
- A. After the sampling trip is scheduled in the AIMS database, the Stream Sampling Field Data Sheet will be printed on Rite-in-the-Rain paper and placed in each sampling site folder.
 - B. Information recorded on the Stream Sampling Field Data Sheet is entered into the AIMS database, followed by quality control (QC) on the data entered by two WAPB staff members. The final QC will be performed by a full-time WAPB staff member experienced with *in-situ* water chemistry data.
 - C. The original hard copy is retained until it is scanned and uploaded to AIMS database or VFC, after which it will be recycled.
- 5.3. OWQ Biological QHEI (Qualitative Habitat Evaluation Index)
- A. Blank QHEI datasheets will be copied onto Rite-in-the-Rain paper and placed in each sampling site folder.
 - B. Information recorded on the QHEI form is entered into the AIMS database, followed by QC on the data entered by two WAPB staff members. The final QC will be performed by a full-time WAPB staff member experienced with QHEI data.
 - C. The original hard copy is retained until it is scanned and uploaded to AIMS database or VFC, after which it will be recycled.
- 5.4. Original Photographic Image Chain of Custody Form
- A. Blank photographic image chain of custody forms will be copied onto Rite-in-the-Rain paper for crew chief and crew members to complete in the field.
 - B. After completion of weekly field sampling activities, the original photographic image chain of custody is used to properly label the digital photos. Downloaded digital photos are renamed in the following format: YY### + direction or subject matter + initials of photographer (for example: 18001 US PDM) and are stored at the following location: S:\IGCN\OWQ\WSP\OWM\RANDOM\Corvallis2023\Site Photos

NOTE: "Corvallis2023" can be changed to the current project/year in which field sampling activities are being conducted.

- C. The original hard copy is retained until it is scanned and uploaded to AIMS database or VFC, after which it will be recycled.

5.5. OWQ Chain of Custody Form

- A. Blank OWQ chain of custody forms will be copied onto Rite-in-the-Rain paper for crew chief and crew members to complete in the field.
- B. After completion of weekly field sampling activities, the OWQ Chain of Custody Form is used by the laboratory custodian to check in samples prior to long-term storage.

- C. After macroinvertebrate samples have been checked in and stored, the OWQ Chain of Custody Form is scanned into a pdf format and renamed in the following format: MMDDYYYY + crew chief's initials + Field COC (for example: 07152018 PDM Field COC). The file is saved at the following location:

S:\IGCN\OWQ\WSP\OWM\RANDOM\Corvallis2023\Chain of Custody\Field Chain of Custody

Note: "Corvallis2023" can be changed to the current project/year in which field sampling activities are being conducted.

- D. The original hard copy is retained until it is scanned and uploaded to AIMS database or VFC, after which it will be recycled.

5.6. Field notebook

- A. After completion of weekly field sampling activities, the field notebook entries for the week are scanned into a pdf format and renamed in the following format: MMDDYYYY + crew chief's initials + Macro Field Notebook (for example: 07152018 PDM Macro Field Notebook). The file is saved at the following location:

S:\IGCN\OWQ\WSP\OWM\RANDOM\Corvallis2023\Chain of Custody\Field Notebook

Note: "Corvallis2023" can be changed to the current project/year in which field sampling activities are being conducted.

- B. When not in use, the field notebook is kept in the IDEM Shadeland macroinvertebrate laboratory for review, in perpetuity.

5.7. AIMS Database

- A. <http://aims.idem.in.gov/AIMS/Pages/Login/>

6.0 Definitions

- 6.1. "AA/AB Number" – Number assigned to each individual watershed sampling event conducted by Indiana Department of Environmental

Management (IDEM) field crews. This number is used to identify the sampling event in the Assessment Information Management System database (AIMS database).

- 6.2. "Agency staff" – Agency staff member who works a regular work schedule, alternative work schedule, or nonstandard work schedule; individual who is employed by the agency on a full-time, part-time, temporary, intermittent, or hourly basis; or an individual who contracts with the agency for personal services.
- 6.3. "Ambient" – Surrounding environmental conditions.
- 6.4. "Assessment Information Management System database (AIMS database)" – IDEM database containing information related to water chemistry; aquatic habitat; macroinvertebrate, fish, and algae communities; fish tissue analyses; sediments; and E. coli bacteria data collected by agency staff from watershed sampling events.
- 6.5. "Chain of custody (COC)" – The records documenting the possession of samples or photographs from the time they are obtained until they are stored, disposed of, or shipped offsite (Appendix 9.6, 9.7).
- 6.6. "Crew chief" – The agency staff person who leads a field crew when conducting field sampling activities.
- 6.7. "Environmental Protection Agency (EPA) site ID" – The identification number given to the 100 random probabilistic sites drawn yearly. Example: INRB16 001.
- 6.8. "Field crew" – The team of agency staff who conducts field sampling activities. Field crews must contain at least one full-time agency staff member from the Probabilistic or Targeted Monitoring Sections in the crew chief position and one or more full-time IDEM staff or Governor's Summer Interns or compensated interns.
- 6.9. "Gazetteer" – A geographical dictionary or directory (i.e., listing cities, towns, rivers, mountains, and other geographic features along with the exact location of these features).
- 6.10. "Glide" – An area common to most modified stream channels that do not have distinguishable pool, run, and riffle habitats; the current and flow is like that of a canal; the water surface gradient is nearly zero (Ohio EPA 2006).
- 6.11. "Indiana Department of Environmental Management (IDEM)" – An agency of Indiana State Government whose mission is to implement federal and state regulations to protect human health and the environment while

allowing the environmentally sound operations of industrial, agricultural, commercial, and government activities vital to a prosperous economy.

- 6.12. "Macroinvertebrate"– Aquatic animals which lack a backbone, are visible without a microscope, and spend some period of their lives in or around water.
- 6.13. "Macroinvertebrate Sample Number" – An identification number used to identify a macroinvertebrate sample. The macroinvertebrate sample number is constructed by combining the last two digits of the year, the two digit designation for the month, the two digit designation for the day, the number of the Field Notebook used by the crew leader to record the sampling event, and a two digit number indicating the order in which the current sample was collected on that particular day. For example, the fourth sample collected by the field crew using Field Notebook #3 on July 15, 2018, would read: MHAB 180715304 ("18" =2018, "07" = July, "15" = 15th day of the month, "3" = Field Notebook #3, "04" = fourth sampled collected that day). The macroinvertebrate sample number does not take precedence over the "AA/AB Number".
- 6.14. "Pool" – An area of the stream with slow current velocity and a depth greater than riffle and run areas; the stream bed is often concave and stream width frequently is the greatest; the water surface slope is nearly zero (Ohio EPA 2006).
- 6.15. "Quality assurance (QA)" – An integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client.
- 6.16. "Quality control (QC)" – The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality. In other words, QC involves measuring the "thing produced" against a standard to ensure it is a quality product that meets the identified need.
- 6.17. "Reconnaissance" – Obtaining information about a site through visual observations and investigating routes to safely access the site, as well as gathering property owner information and access permission.
- 6.18. "Riffle" – The shallow parts of the stream where water flows swiftly over completely or partially submerged pebble to boulder sized rocks to produce surface agitation.

- 6.19. “Run” – Area of the stream that has a rapid nonturbulent flow; a run is deeper than a riffle with a faster current velocity than a pool and is generally located downstream from a riffle where the stream narrows; the stream bed is often flat beneath a run and the water surface is not visibly broken (Ohio EPA 2006).
- 6.20. “Safety data sheet (SDS)” – A sheet containing data regarding the properties of a particular substance or product. It is information intended to provide workers and emergency personnel with procedures for handling or working with a particular substance or product in a safe manner.
- 6.21. “Site folder” – A folder for a specific site that contains all pertinent paperwork concerning the site. Site reconnaissance forms, all field data sheets including those for water chemistry, algal biomass, fish community, macroinvertebrate community, chain of custody forms, etc. are all stored in this folder which is located in a file cabinet in the WAPB office area at the IDEM Shadeland office.
- 6.22. “Site number” – The designated program area specific numeral given to an environmental location of interest.
- 6.23. “Site Reconnaissance Form” – Form used to gather information such as landowner, equipment needed to complete sampling, and the access route to take to the site (Appendix 9.3).
- 6.24. “Stream reach” – A segment of a stream equal in length to 15 times the average wetted width of the stream, with a minimum length of 50 meters and a maximum length of 500 meters.
- 6.25. “Substrate” – The material that composes the stream bed.
- 6.26. “Technical standard operating procedure (TSOP)” – A standard operating procedure that involves environmental data generation, manipulation, or compilation of an analytical process.
- 6.27. “Virtual File Cabinet (VFC)” – The agency’s electronic digital image document repository system, that stores, files, indexes, redacts, reassembles, and securely accesses electronic documents of all types both received and created by the various program areas within the agency.

7.0 Quality Assurance and Quality Control

- 7.1. Ten percent of sites sampled for each macroinvertebrate community sampling project are resampled to measure the precision (or reproducibility) of the sampling methodology to produce a similar macroinvertebrate assemblage. These duplicate samples are selected before field sampling begins by having the AIMS database randomly create n duplicate samples (where $n = 10\%$ of sites rounded to the nearest whole number) for a project. Duplicate samples are collected during the same sampling event as the original sample, by the sample collector using the same equipment. The 50-meter section of stream and riffle area utilized for the duplicate sample are different from those used for the original sample but should feature as similar habitat types and availability as possible. Duplicate samples receive unique AIMS sample numbers and macroinvertebrate sample numbers. The reproducibility of the MHAB sampling method as employed by the sample collector is measured by the Relative Percent Difference (RPD, see Eldin 2011) between the number of macroinvertebrate taxa collected in the normal and duplicate samples where:

$$RPD = \left(\frac{|S - D|}{(S + D)/2} \right) \times 100$$

Where:

S = the number of taxa collected in the original sample

D = the number of taxa collected in the duplicate sample

- 7.2. If the RPD is greater than 25%, corrective action should be taken through calibration of sampling methodology between sample collectors to ensure that sampling methodology is being implemented correctly. The RPD is also calculated for the QHEI scores for each duplicate site which may help to provide an explanation for any observed differences in the RPD for number of collected taxa.

8.0 References

- 8.1. U.S. EPA Standard Methods or Protocols
 - A. 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.
- 8.2. Indiana Codes (IC) or Indiana Administrative Codes (IAC):
 - A. IC 14-8-2-27, [Boundary Waters](#).
- 8.3. Agency Policies
 - A. IDEM. 2000. [Use of Personal Flotation Devices \(PFDs\) by Branch Personnel](#). State Form 4336. Assessment Branch, Indiana Department of Environmental Management, Indianapolis, Indiana.
 - B. IDEM. 2008. [Personal Protective Equipment Policy](#). A-059-OEA-08-P-R0. Office of External Affairs, Indiana Department of Environmental Management, Indianapolis, Indiana.
 - C. IDEM. 2010a. [Health and Safety Training](#), revised October 1, 2010. A-030-OEA-10-P-R2. Office of External Affairs, Indiana Department of Environmental Management, Indianapolis, Indiana.
 - D. IDEM. 2010b. [Change in status of Water Assessment Branch staff in accordance with the Agency training policy](#). State Form 4336. Office of Health & Safety, Indiana Department of Environmental Management, Indianapolis, Indiana.
 - E. IDEM. 2016. [Injury and/or Illness Resulting from Occupational Exposure](#), revised February 12, 2016. A-034-AW-16-P-R3. Office of the Commissioner, Indiana Department of Environmental Management, Indianapolis, Indiana.
 - F. IDEM. 2019. [IDEM Hazard Communication \(HazCom\) Plan](#). IDEM, Office of Program Support, Indianapolis, Indiana.
 - G. IDEM. 2021. [OWQ Watershed Assessment and Planning Branch Laboratory Safety Plan](#). IDEM, Office of Program Support, Indianapolis, Indiana.
- 8.4. Agency Standard Operating Procedures:

- A. IDEM. 2020. [Water Chemistry Field Sampling Procedures](#). B-015-OWQ-WAP-XXX-20-T-R0. IDEM, Office of Water Quality, Watershed Assessment and Planning Branch, Indianapolis, Indiana.
- B. IDEM. 2023. [Procedures for Completing the Qualitative Habitat Evaluation Index](#). B-003-OWQ-WAP-XX-23-T-R2. IDEM, Office of Water Quality, Watershed Assessment and Planning Branch, Indianapolis, Indiana.

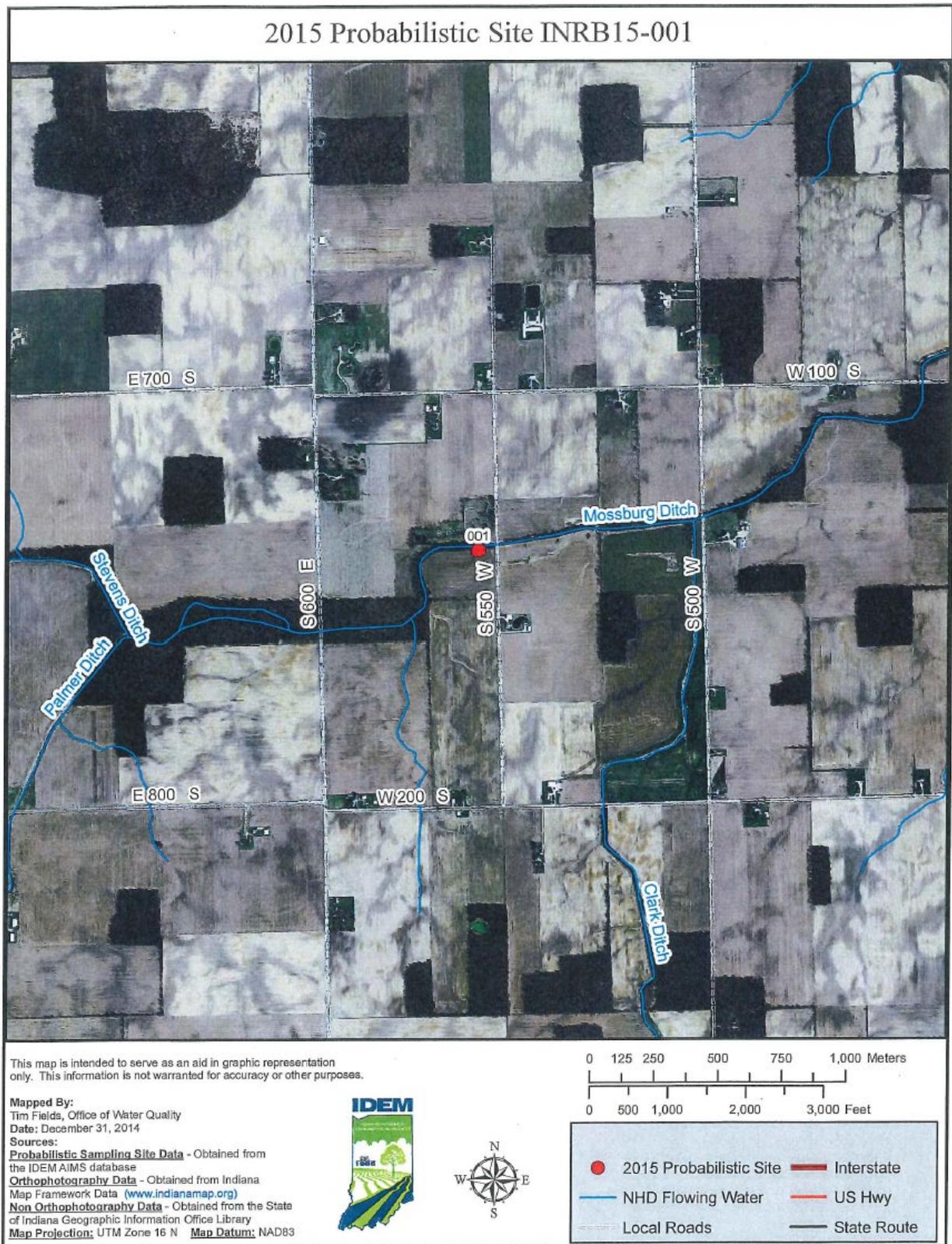
8.5. Other Guidance

- A. Eldin, Ahmed Badr, ed. Modern Approaches to Quality Control. BoD–Books on Demand, 2011.
- B. Fisher Scientific. 2003. [Safety Data Sheet for Ethanol, Alcohol Reagent, anhydrous, denatured](#).
- C. Ohio EPA. 2006. [Methods for Assessing Habitat in Flowing Waters: Using the Qualitative Habitat Evaluation Index \(QHEI\)](#). Ohio EPA Technical Bulletin EAS/2006-06-1.
- D. Indiana Department of Natural Resources free [Online Boating Safety Course](#) provided by the BoatUS Foundation.

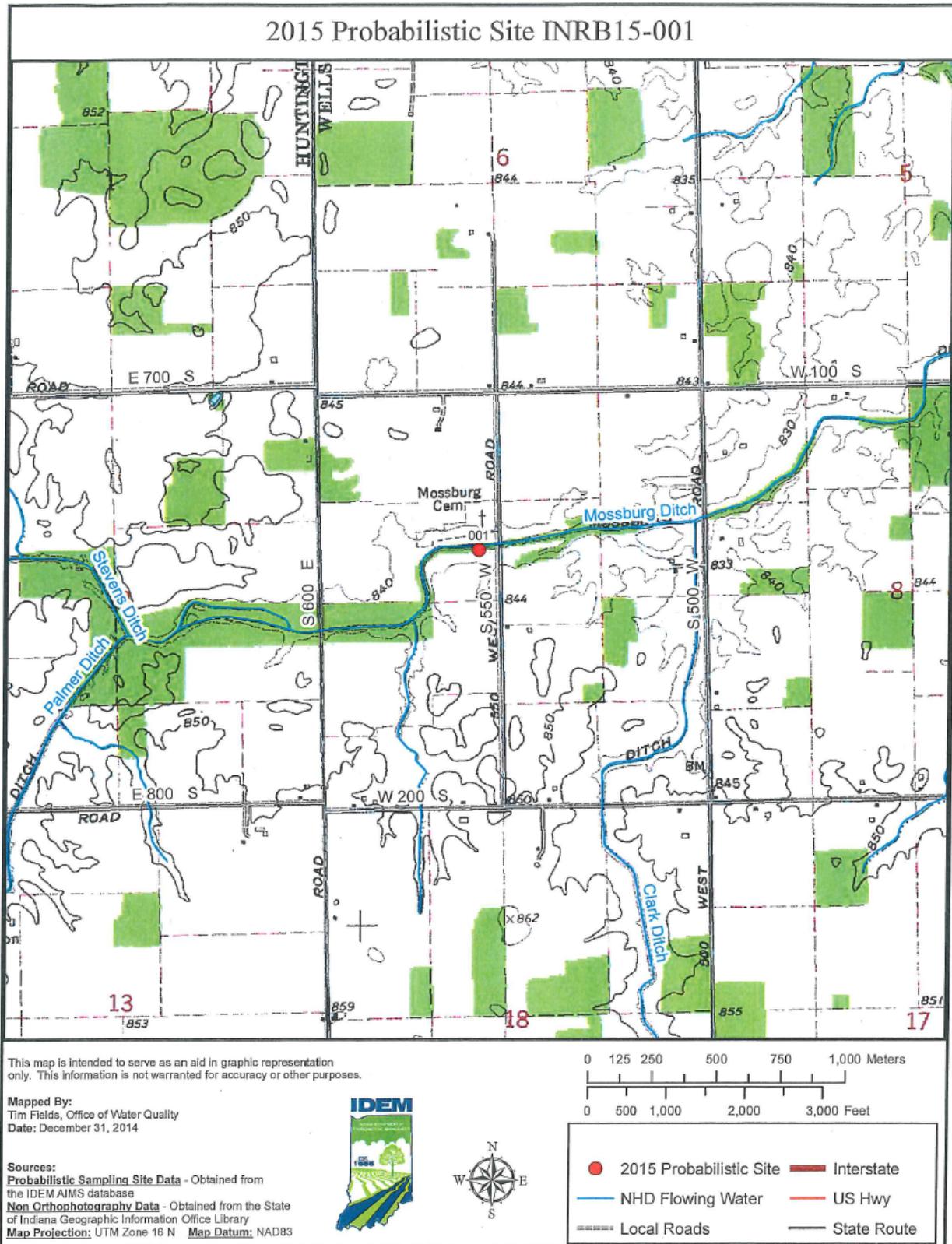
9.0 Appendices

- Appendix 9.1 – Example of an aerial map used to locate the site
- Appendix 9.2 – Example of a topographic map used to locate the site
- Appendix 9.3 – Site Reconnaissance Form
- Appendix 9.4 – Stream Sampling Field Data Sheet
- Appendix 9.5 – Qualitative Habitat Evaluation Index (QHEI) Form
- Appendix 9.6 – Photographic Image Chain of Custody
- Appendix 9.7 – OWQ Chain of Custody
- Appendix 9.8 – Macroinvertebrate Field Sampling Checklist
- Appendix 9.9 – Field Notebook entry example

Appendix 9.1 – Example of an aerial map used to locate the site



Appendix 9.2 – Example of a topographic map used to locate the site



Appendix 9.3 – Example of Site Reconnaissance Form

	Site Reconnaissance Form		EPA Site Identifier	Rank	
			INRB15-001	1	
			Recon #: R-6551 Trip #: R15WQW-1		
Site Number:	WUW-07-0014	Stream:	Mossburg Ditch	County:	Wells
Location Description: CR 550 W					
Reconnaissance Data Collected				Landowner/Contact Information	
Recon Date		Crew Members		First Name	
3/9/2015		TAF KAG		Last Name	
Avg. Width (m)	Avg. Depth (m)	Max. Depth (m)	Nearest Town		
2	.2	.5	Liberty Center		
Water Present?	Site Wadeable?	Riffle/Run Present?	Road/Public Access Possible?		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Site Impacted by Livestock?	Collect Sediment?	Gauge Present?			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
				Street Address	
				City	
				State	
				Zip	
				Telephone	
				E-Mail Address	
				Pamphlet Distributed?	
				<input type="checkbox"/>	
				Please Call In Advance?	
				<input type="checkbox"/>	
				Results Requested?	
				<input type="checkbox"/>	
Rating, Results, Comments, and Planning					
Site Rating By Category (1=easy, 10=difficult)	Reconnaissance Decision		Equipment Selected	Circle Equipment Needed	
Access Route	Pre-Recon Recon in process <u>Approved Site</u> No, Landowner denied access No, Dry No, Stream channel missing No, Physical barriers No, Impounded stream No, Marsh/Wetland No, Bridge gone or not accessible No, Unsafe due to traffic or location No, Site impacted by backwater No, Other		<div style="border: 1px solid black; height: 100px;"></div>	<div style="border: 1px solid black; padding: 5px;"> <input checked="" type="checkbox"/> Backpack <input type="checkbox"/> Boat <input type="checkbox"/> Totebag <input type="checkbox"/> Longline <input type="checkbox"/> Scanoes <input type="checkbox"/> Seine <input type="checkbox"/> Weighted Handline <input type="checkbox"/> Waders <input type="checkbox"/> Gill Net </div>	
2					
Safety Factor					
4					
Sampling Effort					
3					
Comments					
Sketch of Stream & Access Route – Indicate Flow, Direction, Obstacles, & Land Use (Use Back of Page, if Necessary)					
<p>All crews park off of the CR 550 W bridge, frozen during recon so it was hard to tell where the best parking is. May have to park at the cemetery N of site if there isn't a good pull off. Site ~ 250 feet W of bridge. Site was zipped back to the ditch during recon. Walk N bank to site, do not have S bank permission.</p>					
ENT KAG 3.16.15 Q01 KRW 3/16.15 Q02 TAF 3/19/15			40 43 17.540711 -85 19 39.426530		
1/16/2015 15:34:42 PM Site Reconnaissance Form, Page 2 of 101					

Appendix 9.4 – Stream Sampling Field Data Sheet



Stream Sampling Field Data Sheet

Analysis Set #	EPA Site ID	Rank

Sample #	Site #	Sample Medium	Sample Type	Duplicate Sample #								
Stream Name:		River Mile:	County:									
Site Description:												
Survey Crew Chief	Sample Collectors				Sample Collected		HydroLab #	Water Depth/Gage Ht (ft)	Water Flow (cfs)	Flow Estimated?	Algae?	Aquatic Life?
	1	2	3	4	Date	Time						
Sample Taken?		Aliquots		Water Flow Type			Water Appearance			Canopy Closed %		
<input type="checkbox"/> Yes <input type="checkbox"/> No; Frozen <input type="checkbox"/> No; Stream Dry <input type="checkbox"/> No; Other <input type="checkbox"/> No; Owner refused Access		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 6 <input type="checkbox"/> 8 <input type="checkbox"/> 12 <input type="checkbox"/> 24 <input type="checkbox"/> 48 <input type="checkbox"/> 72 <input type="checkbox"/> AS-Flow		<input type="checkbox"/> Riffle <input type="checkbox"/> Dry <input type="checkbox"/> Stagnant <input type="checkbox"/> Pool <input type="checkbox"/> Run <input type="checkbox"/> Flood <input type="checkbox"/> Glide <input type="checkbox"/> Eddy <input type="checkbox"/> Other			<input type="checkbox"/> Clear <input type="checkbox"/> Green <input type="checkbox"/> Sheen <input type="checkbox"/> Murky <input type="checkbox"/> Black <input type="checkbox"/> Other <input type="checkbox"/> Brown <input type="checkbox"/> Gray (Septic/Sewage)			<input type="checkbox"/> 0-20% <input type="checkbox"/> 60-80% <input type="checkbox"/> 20-40% <input type="checkbox"/> 80-100% <input type="checkbox"/> 40-60%		
Special Notes:												

Field Data:

Date (m/d/yy)	24-hr Time (hh:mm)	D.O. (mg/l)	pH	Water Temp (°C)	Spec Cond (µmhos/cm)	Turbidity (NTU)	% Sat.	Chlorine (mg/l)	Chloride (mg/l)	Chlorophyll (mg/l)	Weather Codes						
											SC	WD	WS	AT			
Comments																	
Comments																	
Comments																	
Comments																	
Comments																	
Comments																	
Comments																	

Measurement Flags < > E R	< > E R	< Min. Meter Measurement > Max. Meter Measurement Estimated (See Comments) Rejected (See Comments)	Weather Code Definitions			
			SC Sky Conditions	WD Wind Direction	WS Wind Strength	AT Air Temp

Field Calibrations:

Date (m/d/yy)	Time (hh:mm)	Calibrator Initials	Calibrations			
			Type	Meter #	Value	Units

Calibration Type	pH DO Turbidity
------------------	-----------------------

Preservatives/Bottle Lots:

Group: Preservative	Preservative Lot #	Bottle Type	Bottle Lot #	Groups: Preservatives	Bottle Types
				GC General Chemistry: Ice	2000P 2000mL Plastic, Narrow Mouth
				Nx Nutrients: H2SO4	1000P 1000mL Plastic, Narrow Mouth
				Metals Metals: HNO3	500P 500mL Plastic, Narrow Mouth
				CN Cyanide: NaOH	250P 250mL Plastic, Narrow Mouth
				O&G Oil & Grease: H2SO4	1000G 1000mL Glass, Narrow Mouth
				Toxics Toxics: Ice	500G 500mL Glass, Wide Mouth
				Ecol Bacteriology: Ice	250G 250mL Glass, Wide Mouth
				VOA Volatile Organics: HCl & Thiosulfate	125G 125mL Glass, Wide Mouth
				Pest Pesticides: Ice	40GV 40mL Glass Vial
				Phen Phenols: H2SO4	120PB 120mL Plastic (Bacteria Only)
				Sed Sediment: Ice	1000PF 1000mL Plastic, Coming Filter
				Gly Glyphosate: Thiosulfate	500PF 500mL Plastic, Coming Filter
				Hg Mercury(1631): HCl	60P 60mL Plastic
				Cr6 ChromiumVI(1636): NaOH	250T 250mL Teflon
				MeHg Methyl Mercury(1630): HCl	500T 500mL Teflon
					125T 125mL Teflon

Data Entered By: _____ QC1: _____
 QC2: _____

Appendix 9.5 – Qualitative Habitat Evaluation Index (QHEI) (front)

OWQ Biological QHEI (Qualitative Habitat Evaluation Index)


 Sample # _____ bioSample # _____ Stream Name _____ Location _____
 Surveyor _____ Sample Date _____ County _____ Macro Sample Type _____ Habitat Complete
QHEI Score:

1] SUBSTRATE Check ONLY Two predominant substrate TYPE BOXES and check every type present

Check ONE (Or 2 & average)

BEST TYPES	OTHER TYPES	ORIGIN	QUALITY
PREDOMINANT PRESENT P/G R/R <input type="checkbox"/> BLD/SLABS [10] <input type="checkbox"/> <input type="checkbox"/> BOULDER [9] <input type="checkbox"/> <input type="checkbox"/> COBBLE [8] <input type="checkbox"/> <input type="checkbox"/> GRAVEL [7] <input type="checkbox"/> <input type="checkbox"/> SAND [6] <input type="checkbox"/> <input type="checkbox"/> BEDROCK [5] <input type="checkbox"/>	PREDOMINANT PRESENT P/G R/R <input type="checkbox"/> HARDPAN [4] <input type="checkbox"/> <input type="checkbox"/> DETRITUS [3] <input type="checkbox"/> <input type="checkbox"/> MUCK [2] <input type="checkbox"/> <input type="checkbox"/> SILT [2] <input type="checkbox"/> <input type="checkbox"/> ARTIFICIAL [0] <input type="checkbox"/>	<input type="checkbox"/> LIMESTONE [1] <input type="checkbox"/> TILLS [1] <input type="checkbox"/> WETLANDS [0] <input type="checkbox"/> HARDPAN [0] <input type="checkbox"/> SANDSTONE [0] <input type="checkbox"/> RIP/RAP [0] <input type="checkbox"/> LACUSTRINE [0] <input type="checkbox"/> SHALE [-1] <input type="checkbox"/> COAL FINES [-2]	S I T <input type="checkbox"/> HEAVY [-2] <input type="checkbox"/> MODERATE [-1] <input type="checkbox"/> NORMAL [0] Substrate <input type="checkbox"/> FREE [1] U N I T I Z E D <input type="checkbox"/> EXTENSIVE [-2] <input type="checkbox"/> MODERATE [-1] <input type="checkbox"/> NORMAL [0] Maximum <input type="checkbox"/> NONE [1] 20

NUMBER OF BEST TYPES: 4 or more [2] 3 or less [0]

2] INSTREAM COVER Indicate presence 0 to 3: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed root wad in deep/fast water, or deep, well-defined, functional pools.)

<input type="checkbox"/> UNDERCUT BANKS [1]	<input type="checkbox"/> POOLS > 70cm [2]	<input type="checkbox"/> OXBOWS, BACKWATERS [1]
<input type="checkbox"/> OVERHANGING VEGETATION [1]	<input type="checkbox"/> ROOTWADS [1]	<input type="checkbox"/> AQUATIC MACROPHYTES [1]
<input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> LOGS OR WOODY DEBRIS [1]
<input type="checkbox"/> ROOTMATS [1]		

AMOUNT Check ONE (Or 2 & average)
 EXTENSIVE > 75% [11]
 MODERATE 25 - 75% [7]
 SPARSE 5 - < 25% [3]
 NEARLY ABSENT < 5% [1]
 Cover Maximum 20

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4] <input type="checkbox"/> MODERATE [3] <input type="checkbox"/> LOW [2] <input type="checkbox"/> NONE [1]	<input type="checkbox"/> EXCELLENT [7] <input type="checkbox"/> GOOD [5] <input type="checkbox"/> FAIR [3] <input type="checkbox"/> POOR [1]	<input type="checkbox"/> NONE [6] <input type="checkbox"/> RECOVERED [4] <input type="checkbox"/> RECOVERING [3] <input type="checkbox"/> RECENT OR NO RECOVERY [1]	<input type="checkbox"/> HIGH [3] <input type="checkbox"/> MODERATE [2] <input type="checkbox"/> LOW [1]

Channel Maximum 20

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream

EROSION	RIPARIAN WIDTH	FLOOD PLAIN QUALITY	CONSERVATION TILLAGE
<input type="checkbox"/> NONE/LITTLE [3] <input type="checkbox"/> MODERATE [2] <input type="checkbox"/> HEAVY/SEVERE [1]	<input type="checkbox"/> WIDE > 50m [4] <input type="checkbox"/> MODERATE 10-50m [3] <input type="checkbox"/> NARROW 5-10m [2] <input type="checkbox"/> VERY NARROW [1] <input type="checkbox"/> NONE [0]	<input type="checkbox"/> FOREST, SWAMP [3] <input type="checkbox"/> SHRUB OR OLD FIELD [2] <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] <input type="checkbox"/> FENCED PASTURE [1] <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]	<input type="checkbox"/> CONSERVATION TILLAGE [1] <input type="checkbox"/> URBAN OR INDUSTRIAL [0] <input type="checkbox"/> MINING /CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.
 Riparian Maximum 10

5] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	Recreation Potential
Check ONE (ONLY!) <input type="checkbox"/> > 1m [6] <input type="checkbox"/> 0.7 - < 1m [4] <input type="checkbox"/> 0.4 - < 0.7m [2] <input type="checkbox"/> 0.2 - < 0.4m [1] <input type="checkbox"/> < 0.2m [0] [metric = 0]	Check ONE (Or 2 & average) <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] <input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	Check ALL that apply <input type="checkbox"/> TORRENTIAL [-1] <input type="checkbox"/> SLOW [1] <input type="checkbox"/> VERY FAST [1] <input type="checkbox"/> INTERSTITIAL [-1] <input type="checkbox"/> FAST [1] <input type="checkbox"/> INTERMITTENT [-2] <input type="checkbox"/> MODERATE [1] <input type="checkbox"/> EDDIES [1]	(Check one and comment on bank) <input type="checkbox"/> Primary Contact <input type="checkbox"/> Secondary Contact Pool/Current Maximum <input type="text"/> 12

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

Check ONE (Or 2 & average) NORIFFLE [metric = 0]

RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2] <input type="checkbox"/> BEST AREAS 5 - 10cm [1] <input type="checkbox"/> BEST AREAS < 5cm [metric = 0]	<input type="checkbox"/> MAXIMUM > 50cm [2] <input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] <input type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> NONE [2] <input type="checkbox"/> LOW [1] <input type="checkbox"/> MODERATE [0] <input type="checkbox"/> EXTENSIVE [-1] Riffle/Run Maximum <input type="text"/> 8

6] GRADIENT (ft/mi) VERY LOW - LOW [2-4] % POOL: % GLIDE:
 MODERATE [6-10] % RUN: % RIFFLE:
DRAINAGE AREA (mi²) HIGH - VERY HIGH [10-6] Gradient Maximum 10

Appendix 9.5 – Qualitative Habitat Evaluation Index (QHEI) (back)



OWQ Biological QHEI (Qualitative Habitat Evaluation Index)

COMMENT _____

A-CANOPY

- > 85% - Open
- 55% - < 85%
- 30% - < 55%
- 10% - < 30%
- < 10% - Closed

B-AESTHETICS

- Nuisance algae
- Invasive macrophytes
- Excess turbidity
- Discoloration
- Foam/Scum
- Oil sheen
- Trash/Litter
- Nuisance odor
- Sludge deposits
- CSOs/SSOs/Outfalls

C-RECREATION

- Area
- Depth
- Pool: > 100 ft² > 3 ft

D-MAINTENANCE

- Public Private
- Active Historic
- Succession: Young Old
- Spray Islands Scoured
- Snag: Removed Modified
- Leveed: One sided Both banks
- Relocated Cutoffs
- Bedload: Moving Stable
- Armoured Slumps
- Impounded Desiccated
- Flood control Drainage

E-ISSUES

- WWTP CSO NPDES
- Industry Urban
- Hardened Dirt & Grime
- Contaminated Landfill
- BMPs: Construction Sediment
- Logging Irrigation Cooling
- Erosion: Bank Surface
- False bank Manure Lagoon
- Wash H₂O Tile H₂O Table
- Mine: Acid Quarry
- Flow: Natural Stagnant
- Wetland Park Golf
- Lawn Home
- Atmospheric deposition
- Agriculture Livestock

Looking upstream (> 10m, 3 readings; ≤ 10m, 1 reading in middle); Round to the nearest whole percent

% open	Right %	Middle %	Left %	Total Average %
	X	X	X	

Stream Width (m):

Stream Drawing:

Appendix 9.6 – Photographic Image Chain of Custody Form

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER QUALITY/ WATERSHED ASSESSMENT AND PLANNING BRANCH
Original Photographic Image Chain of Custody

CERTIFICATION: I certify that the following original photography images were taken by me or were later formally transferred to my custody and have been in my possession since that time. Date:	Print Name:	DOCUMENT RETENTION This document must be retained as future verification of authenticity of the following original photographic images.
	Signature:	

Site Identification Number, Subject of Photograph, Initials of Photographer	Photo No.	Date & Time Taken	Photographer Name	Digital Storage Media (floppy, CD, etc)	Folder Name (for digital only)
Example: 17W001 LongnoseGar KRW	2	6/26/2017 16:00	KRW	Shared (\state.in.us\file1\IDEM) (S.)	S:\IGCN\OWQ\WSP\OWM\Biological Studies\Measure W2017\Pictures

Previous Transfer Record: (if applicable)

Comments:

Transfer of Custody- I certify receipt of the above photographic images	Date	Time
Relinquished by:		
Received By:		
Relinquished by		
Received By:		

Appendix 9.8 – Macroinvertebrate Multi-habitat (MHAB) Sampling Load List

Macroinvertebrate Multi-habitat (MHAB) Sampling Load List

Macroinvertebrate Field Equipment:

D-frame net with extra net bag
2.5 gallon buckets (2)
No. 35 (500 micrometer) sieve
White sorting tray
Tote containing 10-12 250 ml jars pre-filled
with 70% ethanol/isopropyl alcohol
Forceps (2)
Kitchen timer or wristwatch
Field notebook
Clipboard with paperwork/forms:
Site Reconnaissance form
Stream Sampling Field Data Sheet
QHEI form
Label paper
Sample Chain of Custody form
Photo Chain of Custody form
First Report of Injury form
Scientific Collectors Permit
Pencils and sharpener
Sharpies
Backpack

Chemical/Physical Field Equipment:

Hydrolab (with extra batteries)
Winkler kit
Turbidimeter and vial
Temperature/pH probe
Densimeter
Digital camera
Phone (with car charger)
GPS (with car charger and extra batteries)
Rangefinder
50 meter Tape Measure

Canoe/Boat Equipment:

Throw cushion and bag
Paddles
Rope
Carabiners (2)
Canoe

Canoe racks or foam blocks
Front tie down and canoe tiedowns
Canoe lock (overnights only)
Boat box
Boat motor gas (possibly 2-cycle oil)
Funnel
2 inch ball hitch
Padlock and key
Boat Pouch

Vehicle Equipment:

Eyewash bottles
Hand sanitizer
Mosquito repellent
Technu (poison ivy treatment)
First aid kit
Goggles
Fire extinguisher
Spare tire and jack
Jumper cables
Flashlight
Emergency roadside triangles
Square point shovel
Winch controller
Winch anchor
Machete and sheath
Cable ties
Duct tape
Paper towels
Toolbox
Water cooler
Gazetteer
Vehicle Binder

Personal Equipment:

Waders and boots
PFD with whistle
Business cards
Water bottle
Hat
Change of clothes
Polarized sunglasses

2/7/2023

Appendix 9.9 – Field Notebook Entry Example

170907401 AB29100	HARRY COOL DITCH, MARSHALL Co. SR 17, 7 SEPT 2017 TED, REE, MVM 50 m BOTH BANKS, KICK IN SAND/GRAVEL RUN
170911401 AB29066	YELLOW RIVER, STARKE Co. CR 200 E, 11 SEPT 2017 50 m RIGHT BANK, No KICK REE, TED
170911402 AB29074	YELLOW RIVER, STARKE Co. YELLOW RIVER ROAD, 11 SEPT 2017 REE, TED 50 m LEFT BANK, No KICK
170911403 AB29062	YELLOW RIVER, STARKE Co. YELLOW RIVER ROAD, 11 SEPT 2017 REE, TED 50 m LEFT BANK, No KICK
170912401 AB29099	MILL CREEK, LAPORTE Co. LONG LANE, 12 SEPT 2017 REE, TED 50 m LEFT BANK, No KICK
170912402 AB29110 (FIELD DUP)	MILL CREEK, LAPORTE Co. LONG LANE, 12 SEPT 2017 REE, TED 50 m LEFT BANK, No KICK
170913403 AB29063	YELLOW RIVER, MARSHALL Co. REDWOOD ROAD, 12 SEPT 2017 TED, REE 50 m LEFT BANK, KICK IN GRAVEL RUN