

ACKNOWLEDGEMENTS

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1.0 SCOPE AND APPLICABILITY

This document presents the North Dakota Department of Environmental Quality, Division of Water Quality's (DWQ) Standard Operating Procedure (SOP) for collecting fish in wadable rivers and streams. This SOP applies to all DWQ field staff, non-DWQ cooperators, and citizen volunteers.

2.0 SUMMARY OF METHOD

Fish are an important aquatic community, especially in perennial rivers and streams. Fish are not only highly visible to the public but are also easily sampled by professional biologists. There are several attributes of fish communities that make them desirable for biological monitoring and assessment programs (Simon 1998). These attributes include: 1) fish populations and individuals generally remain in the same area during summer seasons; 2) fish communities are persistent and recover from natural disturbances rapidly; 3) most fish species have long life spans (3-10+ years) and can reflect both long-term and current water quality; 4) aquatic life uses described in most state's water quality standards are generally characterized in terms of fish; 5) the sampling frequency for trend assessment is less than the sampling frequency for short-lived organisms; and 6) the taxonomy, distribution, life histories, and tolerances to environmental stressors of most North American fishes is well documented.

Fish sampling follows a disciplined collection procedure to get a repeatable, representative, distance-specific, and quantitative estimate of taxa richness and biomass. Fish collection procedures must focus on a multi-habitat approach where all available habitats are sampled in proportion to their availability in the stream sample reach. Each sample reach should contain riffle, run, and pool habitat when available. To avoid their hydrological effects on habitat quality, the sample reach should be sufficiently upstream of any bridge or road crossing, whenever possible. In the end, however, wade ability and accessibility may ultimately determine the exact location of the sample reach. Sampling is conducted from mid to late summer to take advantage of stable, low flow conditions. The accurate identification of each fish collected is essential, and species-level identification is required (including hybrids). Field identification of fish is acceptable. However, voucher specimens must be preserved and retained for independent laboratory verification.

Regardless of the sampling method, all fish sampling gear types are considered selective to some degree. Electrofishing has proven to be the most comprehensive and effective single method for collecting stream fishes. Pulse DC (direct current) electrofishing is the method of choice to obtain a representative sample of fish at each sampling site.

The following methods have been developed, in part, based on the Rapid Bioassessment Protocol for Use in Streams and Wadable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition (Barbour et al. 1999).

3.0 HEALTH AND SAFETY WARNING

Field personnel should take appropriate precautions when operating electrofishing gear on, in, or around the water. All sampling crews should be equipped with personal protective equipment (PPE). This equipment would include non-breathable waders, rubber gloves, eye protection, etc. It is also required that at least 2 members of the fish collection team be certified in CPR (cardiopulmonary resuscitation) and have basic first aid training. When operating a boat, the North Dakota's boating laws and rules shall be followed by all field personnel.

Field personnel should be aware that hazardous conditions potentially exist at every waterbody. If unfavorable conditions are present at the time of sampling, the sample visit is recommended to be rescheduled. If hazardous weather conditions arise during sampling, such as lightning or high winds, personnel should cease sampling and move to a safe location.

4.0 CAUTIONS

If any species of special concern (e.g., threatened, or endangered) are encountered they should be noted and released immediately on site.

5.0 INTERFERENCES

When natural barriers to fish migration (e.g., riffle areas) are lacking in the sample reach, it is recommended that a blocking net be placed on either end of the reach to prevent fish from escaping^[SMU1]. Young of year fish less than 25 mm in length are not included in the analysis.

6.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

All personnel collecting fish in wadable rivers and streams must read this SOP annually and acknowledge they have done so via a signature page (see Appendix B). New field personnel must also demonstrate successful performance of the method. The signature page will be signed by both trainee and trainer to confirm that training was successfully completed and that the new monitor is competent in carrying out this SOP. The signature page will be kept on-file at DWQ along with the official hard copy of this SOP.

7.0 EQUIPMENT AND SUPPLIES

Field Equipment and Supplies

- North Dakota Game and Fish Department or other appropriate scientific collection permit(s)
- Backpack, long-line, or tote barge-mounted electroshocker apparatus
- Dip nets
- Block nets (i.e., seines) *optional
- Polarized sunglasses
- Life jacket
- electrician's high voltage rubber gloves
- chest waders
- ear protection (plugs or muffs) *optional
- plastic buckets (20)
- small plastic perforated baskets (20)
- electronic scale
- spring scale
- measuring board
- ruler
- 1 liter and 500 ml jars for voucher/reference specimens
- 10 % buffered formalin (formaldehyde solution)
- fish collection field data sheets
- taxonomic key(s)
- pencils
- digital camera
- maps
- Global Positioning System (GPS)
- first aid kit

8.0 FIELD PROCEDURE

1. —Determine the sampling reach length and mark its upstream and downstream limits. When selecting the sample reach, consideration should be given to the influences of major tributaries and bridge/road crossings. -Where feasible, the reach should be located a sufficient distance upstream from these influences to decrease their effect on overall habitat quality. The exact location (e.g., latitude and longitude) of the downstream limit of the reach should be determined with a Global Positioning System (GPS) and recorded on the Biological Monitoring Field Collection Data Form (Figure 7.16.1) along with the station ID, water body name, station description, major basin, level IV ecoregion, county, and township/range/section.

Two methods may be employed to determine the sample reach. The first method is termed the “fixed-distance designation.” Using the fixed-distance method a standard 150-meter stream length is sampled. -The sample reach should include a mixture of all available stream/river habitats (i.e., riffles, runs, pools, snags, overhanging banks). If all available habitats cannot be sampled within the 150-meter designation, the sampling reach length should be extended either upstream or downstream by increments of 50 meters.

An alternative to the fixed-distance designation is the “proportional-distance designation.” With this method, the sample reach is determined by taking the bank full width of the river or stream times a standard number (e.g., 40 times the stream width is used by EPA’s Environmental Monitoring and Assessment Program (EMAP) for sampling). The method employed to determine the sample reach should be described in the project specific Quality Assurance Project Plan (QAPP).

2. —Complete a habitat assessment of the sample reach. -The Department’s default habitat assessment methodology is the Rapid Bioassessment Habitat Assessment methodology described by Barbour et al. (1999). When other habitat assessment methods (e.g., EMAP) are used they should be described in the project specific QAPP.

3. —Complete the remaining field information on the Biological Monitoring Field Collection Data Form (Figure 7.16.1) by recording information on ambient weather conditions, stream water quality (e.g., temperature, pH, specific conductance, dissolved oxygen), and physical condition (e.g., shoreline condition, bottom substrate, flow, average width, and depth), the method of collection, start time, ending time and duration of sampling.

4.—Begin sampling via long line electrofishing with a minimum of a three (3) person fisheries crew; one person to handle the wand, one person to pull the line and to carry buckets full of stream water to hold the stunned fish; and one person to attend the generator. The third person attending the generator should always maintain contact with the electrofishing crew and should be prepared to turn off the generator should there be an accident. The safety of all personnel and the quality of the data is assured through the adequate education, training, and experience of all members of the electrofishing team. At least one biologist with training and experience in electrofishing techniques and fish taxonomy must be involved in each sampling event. It is also required that at least 2 members of the fish collection team be certified in CPR (cardiopulmonary resuscitation) and have basic first aid training.

Sampling begins at the bottom or furthest downstream end of the reach. -Sampling is performed by shocking along both shorelines in streams 5 meters wide and wider, or following a serpentine pattern along both shores for streams less than 5 meters wide. All habitat and stream types are sampled thoroughly to capture all fish encountered. Fish collected are held in buckets for later identification and enumeration.

Note: When natural barriers to fish migration (e.g., riffle areas) are lacking in the sample reach, it is recommended that a blocking net be placed on either end of the reach to prevent fish from escaping.

5.—Adult and juvenile specimens from each site are counted and identified to species utilizing taxonomic keys relative to the region. Smaller and more difficult to identify taxa can be preserved for later identification in the laboratory. Young of year fish less than 25 mm in length are not included in the analysis. As fish are sorted, record the number of individuals of each species collected, the composite weight of each species, and the minimum and maximum length of each species on the Fish Collection Field Form (Figure 7.16.2). All fish should be examined for the presence of gross external anomalies (e.g., deteriorated, or eroded fins, lesions, or tumors) and their number recorded for each species. The presence of hybrid species encountered in the field should also be recorded, and when possible, the potential parental combinations recorded.

6.—A voucher sample with representation of each species sampled is jarred, preserved with 10% buffered formalin, and labeled for permanent record. A label, containing the site identification, river/stream name, site description, date of collection, and sampler(s), should be placed on the outside of the jar as well as inside the jar.

7.—After data collection all fish not retained in the voucher sample are released back into the waters from which they came.

Note: If any species of special concern (e.g., threatened or endangered) are encountered they should be noted and released immediately on site.

8.—After the final site clean-up and prior to leaving, take a minimum of one upstream and one downstream photograph from the mid-point of the sample reach.

9.—Quality and quantity assurance are verified by revisiting a minimum of 3^[SMJ2] sites each sampling year. The re-sampling will identify the range of variance associated with the method of sampling and analysis employed. For future reference and verification, a voucher collection of all species collected at each site will be preserved and archived by the NDDEQH.

9.0 DATA AND RECORDS MANAGEMENT

Fish data will be recorded on the field form 7.16.1 (Appendix A). Once personnel reach the office, data recorded on the field form are entered into the DWQ Ecological Data Application System (EDAS). Field notes should be used to record any quality control activity performed such as measurements taken by more than one sampler, or to record any sampling conditions that may have interfered with the data collected. Field forms and notes should be stored in the appropriate project folder at DWQ.

10.0 QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance and quality control (QA/QC) procedures will be foallowed as explained above. Individuals will have to foallow the field and laboratory standard operating procedures to comply with the QA/QC for fish collection in wadable rivers and streams.

11.0 REFERENCES

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

Simon, T.P. 1998. Introduction: Biological Integrity and Use of Ecological Health Concepts for Application to Water Resource Characterization, in T.P. Simon Ed. Assessing the Sustainability and Biological Integrity of Water Resources Using Fish Communities. CRC Press, Boca Raton, FL. 3-17.

Related DWQ SOPs

7.13 Whole Fish Tissue Sample

7.14 Fish Skin on Fillet Tissue Sample Collection

7.15 Fish Tissue Plug Samples for Mercury Analysis

APPENDIX A
Field Reporting Form

SITE ID: _____ **DATE:** _____ / _____ / _____

FIELD NUMBER _____ **SAMPLERS:** _____

STATION DESCRIPTION: _____

LATITUDE: _____ **LONGITUDE:** _____

ECOREGION (circle one): 43 42 46 48

INVERTEBRATE COLLECTION METHOD (circle one): D-NET OTHER _____

REACH LENGTH: _____ meters

FIELD WATER CHEMISTRY	SITE PHOTOS
TEMP:	UPSTREAM:
DO:	DOWNSTREAM:
pH:	COMMENTS:
COND:	

WEATHER CONDITIONS (Temp., Wind, etc.):

COMMENTS:

SITE DRAWING (Show direction of water flow and north)

COMMENTS:

Checked by: _____ Date: _____

09/23/2020

SITE ID:		FIELD No.:		Latitude:		Longitude:	
LOCATION:				Wetted Width:		REACH LENGTH:	
DATE:		START TIME:		STOP TIME:		TOTAL TIME:	
WATER BODY:		WATER CHEM: YES / NO		WATER CLARITY: TURBID CLEAR			
DO:	pH:	Cond:	Temp:	VEGETATION INSTREAM: HEAVY LIGHT NONE			
Cloud Cover: %		Wind Speed: mph		Air Temp: ° F			
CREW PERSONNEL:				FISH ID PERSON:			
METHODS/GEAR:							
COMMENTS:							

FISH SPECIES	NUMBER of Individuals	WEIGHT	LGTH MIN	LGTH MAX	DELT	NOTES/FLAG

FISH SPECIES	NUMBER of Individuals	WEIGHT	LGTH MIN	LGTH MAX	DELT	NOTES/FLAG

COMMENTS/ EXPLAIN FLAGS:

Checked by: _____

Date: _____

APPENDIX B
SOP Acknowledgement and Training Form

