

Standard Operating Procedure 1: Pre and Postseason Fisheries Tasks, version 1.0

Pre and postseason work largely entails visual or mechanical assessment of required equipment (see below). The following list outlines the minimum requirements in order to properly prepare field equipment for use.

Preseason Tasks Starting in February:

- 1) Compliance is completed/renewed every five years — ensure it is up to date.
- 2) Ensure Hydrolabs® are functioning properly by cleaning and calibrating (SOP 6).
- 3) Check waders for leaks or damage. Repair damage or dispose of waders.
- 4) Remark/repair all measuring poles, depth sticks etc. (make sure the depth is accurate as the tips may wear).
- 5) Calibrate both flowmeters to zero with directions in manual.
- 6) Check electrofisher batteries, order and build new ones as needed.
- 7) Make new data sheets for the current year — use waterproof paper.
- 8) Inventory sampling nets — order or repair if needed.
- 9) Repair probes.
- 10) Repair/polyurethane measuring boards.
- 11) Check packs, mend tears, wash if needed.
- 12) Ensure generators are running, run dry, and fog again.
- 13) On April 1, put new batteries in all aquatic macro equipment (Hydrolabs/flowmeters).
- 14) Calibrate both flowmeters to zero with directions in manual. On May 15th put new batteries in all of the scales for fisheries.
- 15) Calibrate both flowmeters to zero with directions in manual prior to fish work.
- 16) Mend block net.
- 17) Mend fish cages.
- 18) Get protocols, JHAs, and other materials ready for crew training.
- 19) Update activity notice and distribute parkwide.

Postseason Tasks Starting before Temporary Employees Leave:

- 1) Take batteries out of flowmeters.
- 2) Take batteries out of scales.
- 3) Inspect all equipment and tag problems.
- 4) Ensure there is one good set of equipment that can be quickly operational in case a problem arises during the winter.
- 5) Purge all gas/oil mix from generators (tank and carburetor) and oil/fog cylinders.
- 6) Place electrofisher batteries on chargers for one day every 3 weeks so all batteries stay fully charged.
- 7) Ensure data is correct and go through with data manager before final acceptance.
- 8) Ensure all GPS data is downloaded and correct.
- 9) Check Hydrolabs every two to three weeks and replace fluids and membranes as needed.

Fish Monitoring Field Equipment Checklist

Fish Sampling

- ☐ Backpack Electrofishing Units
- ☐ Anode/Cathode Probes
- ☐ Cooler with Gas Mix
- ☐ Tool Kit with Spark Plugs
- ☐ Long Handled Dip Nets
- ☐ Short Handled Dip Nets
- ☐ Holding Cage(s)
- ☐ Block Nets (large sites)
- ☐ Plastic Buckets
- ☐ Blue Plastic Tubs
- ☐ Bucket Pack(s)
- ☐ Back Packs
- ☐ Clove Oil (brown Nalgene bottle)
- ☐ Measuring Boards
- ☐ Electronic Balances
- ☐ 12 Extra AA and Two extra 9v batteries
for balances
- ☐ Rubber Gloves
- ☐ Polarized Glasses
- ☐ Fish Key (Jenkins and Burkhead)
- ☐ Fish species abbreviation list

Flow and Physical Site Measurements

- ☐ 100 m tape
- ☐ 30 m tape
- ☐ Marsh McBirney flow meter
- ☐ Extra batteries for MMB (2 size "D")
- ☐ Top setting metric wading rod
- ☐ Depth stick (graduated in .01m)
- ☐ Compass
- ☐ Clinometer

General Equipment

- ☐ 2 Hand Held Radios w/Batteries
- ☐ First Aid Kit
- ☐ Site Directions
- ☐ GPS
- ☐ GPS Batteries (2 "AA")
- ☐ Field Data Forms (1 set per site)
- ☐ Site Form/H2O/Discharge
- ☐ Gamefish Data Form
- ☐ Nongame Fish Data Form
- ☐ Habitat Data Form
- ☐ Metal Clipboards
- ☐ Pencils
- ☐ Camera
- ☐ Hip Boots
- ☐ Drinking Water
- ☐ Lunches

Stream Chemical Measurements

- ☐ Hydrolab Multi-Sensor Unit
- ☐ Hydrolab data Display System
- ☐ Hydrolab data cable
- ☐ Hydrolab weighted sensor guard

Gear Cleaning

- ☐ 2 Large tube
- ☐ Dish detergent
- ☐ Salt
- ☐ Bucket with lid

Equipment location - Gas House (to be loaded in suburban)

- ___ Packs (subtract 3 from the crew size to get the total number of packs you should have.)
- ___ First Aid Kit
- ___ Tool Kit (yellow pouch)
- ___ Hip Boots
- ___ Wading boots and stocking foots
- ___ Neoprene Waders/Boots (only deep streams)
- ___ Clove Oil (in **brown** Nalgene bottles)
- ___ Measuring Boards (3) Eels require the big white board
- ___ Electronic Balances (Check with Sup. for size needs)
- ___ Rubber Gloves (bring extra)
- ___ 100 m tape
- ___ 30 m tape
- ___ Marsh McBirney flow meter
- ___ Clinometer
- ___ Hydrolab Multi-Sensor Unit (Bring All Hydrolab Parts to Wet Lab On Thursday Evening)
- ___ Hydrolab Data Display System
- ___ Hydrolab Sensor Guard
- ___ Water filter
- ___ Extra AA batteries (16)
- ___ Extra 9Volt batteries (2)
- ___ Extra "D" batteries (2)

Equipment Location - Shed (to be loaded in pick-up truck)

- ___ Backpack Electrofishing Units
- ___ Shocker Batteries (from closet)
- ___ Anode/Cathode Probes
- ___ Cooler with Gas Mix (if gas units are for backup)
- ___ Long Handled Dip Nets
- ___ Short Handled Dip Nets
- ___ Holding Cage(s)
- ___ Block Nets (large sites)
- ___ Plastic Buckets (1 per species)
- ___ Blue Plastic Tubs
- ___ Bucket Pack(s)
- ___ Top setting metric wading rod
- ___ Depth stick (graduated in .01m)
- ___ Bucket with Lid
- ___ Dish Detergent
- ___ Salt

Shenandoah National Park Field Equipment Description

Backpack Electrofishing Units:

The principal electrofisher in use at Shenandoah is the Smith-Root, Model LR-24 on a backpack frame. This unit utilizes 24 volt sealed lead acid batteries which seem to hold up in our low conductivity streams.

The backup unit in use at Shenandoah is the Smith-Root, Model 15-D backpack electrofisher that was designed for use in low to medium conductivity waters. Each unit consists of a Honda model EX350 generator and a transformer box mounted on a reinforced nylon backpack frame.

Anode/Cathode Probes:

Probes for the backpack units consist of two 1" x 60" fiberglass poles each activated by pressing the rubber flapper forward against the pole. A magnet within the flapper will close the reed switch within the pole handle and activate the output. Each probe is also fitted with a ½" diameter aluminum frame. The anode net frame is equipped with a 3/16" mesh nylon net that is 2" deep and the cathode consists of the aluminum frame only. A "rattail" may be used for exotic fish removals.

Cooler with Gas Mix:

The recommended fuel mixture for the generators is 100:1 unleaded gas/small engine oil. The fuel mix should be thoroughly mixed in the metal 2 ½ gallon gas can labeled "Shocker". For daily use, the fuel mix is transported in aluminum fuel bottles of 1 liter capacity. Individual fuel bottles should be packed into the Rubbermaid® cooler labeled "Fuel" for transport in any vehicle. At the parking site, individual fuel bottles are stowed in the side pocket of an available backpack for transport to the monitoring site(s).

Tool Kit with Spark Plugs:

The tool kit is contained in a small yellow bag. In addition to spark plugs, the tool kit contains a wrench, a roll of electrical tape, a tube of waterproof cement, washers, bolts, nuts and other spare parts for the shockers, packs and waders.

Long Handled Dip ("Hoop") Nets:

Long handled dip nets consist of ½" aluminum frames with 3/16" x 18" mesh mounted on 60" fiberglass poles. Adjustments can be made to mesh depths by knotting the bottom of the net to the desired level. These are used primarily for capturing stunned fish in the stream and for transferring fish between buckets. Net replacements are SHR-1's.

Long Handled Dip ("Stealth") Nets:

Stealth nets utilize the smaller net frame of the anode and cathode with a 6 inch deep BDR-3 net. These are used primarily for capturing stunned fish in extremely shallow/cobble filled streams. A stealth net may not be used for bucketing fish if a hoop net is in use for netting either side of the

shocker since many fish are lost transferring from a larger net to a smaller net. It is acceptable (by stream) to use an even shallower BRD-3 net (2-3 inches deep).

Short Handled Dip (“Dinky”) Nets:

These nets consist of 3/16” x 4” mesh minnow nets with aluminum frames mounted on 24” aluminum handles. Short handled nets should only be used at the processing site for sorting and transferring fish between buckets and the electronic balances. Net replacements are BDR-4’s.

Holding Cages:

Holding cages consist of frames constructed from 3/4” PVC pipe and cemented copper fittings equipped with special ordered net boxes or cages. Each 12” x 16” x 20” x 3/16” mesh net box is equipped with a zippered top for loading, unloading and preventing the escape of captured fish. Holding cages are erected on site and submerged in shaded pool habitats such that the bottom 2/3 of the cage is submerged in the stream. These are typically located adjacent to the processing site either upstream or downstream of the monitoring site.

Block Nets:

These 4’ x 25’ non weighted nets are typically needed at the largest sites (lower Rapidan and lower Moorman’s River) to adequately block the downstream end of these sections to impede fish movements in or out of the site. Associated gear includes a 100’ x 3/8” length of steel cable, 3/8” cable clamps, 45 double-ended snap connectors and a 3/8” socket set with spare 9/16” sockets. These items are typically stored together in a single five-gallon bucket. The top of each net is suspended from the steel cable and the bottoms are anchored to the streambed with large rocks.

Plastic Buckets:

Plastic five-gallon buckets are used for temporarily storing, transporting and processing captured fish. The number needed is determined by the expected number of species at each site, expected fish volumes and the number of participating crew as based on previous experience at individual sites.

Plastic Tubs:

The large tubs are used for sorting large volumes of fish and for processing trout or other species captured in very large numbers, primarily to prevent overcrowding. The specific number needed is determined by anticipated volumes of trout and/or other fish based on results from previous years.

Bucket Pack(s):

These pack frames are typically needed to transport large numbers of buckets to and from monitoring sites.

Back Packs:

The specific number of packs needed on any particular day is largely dictated by the number of participating crew. For most park streams, the number of packs equals the number of crew minus three since three individuals are needed to carry the two shockers and one bucket pack. Every person on the crew will be required to transport either a shocker, bucket pack, or regular backpack loaded with sampling and/or personal gear. Generally, the larger the crew, the more packs are required to accommodate the additional personal gear. Several pack sizes and styles are available to accommodate individual needs.

Clove Oil/Ethanol Mix:

Clove oil mixed with ethanol in a 1:10 ratio (clove oil/ethanol) serves as a good fish anesthetic which reduces handling stress. This compound is stored and transported in small (250 mL) brown nalgene bottles and is used primarily for gamefish and eels. Non-game fish may be transferred to a net and anesthetized for a short period of time before weighing.

Measuring Boards:

All measuring boards consist of steel rulers ranging in size from 0-300mm to 0-450mm, attached to a wood trough with a wood stop at the “0” end. It is helpful to have the three existing measuring boards present at each site. Eels will take the 1 ½ inch pipe “eel board”.

Electronic Balances:

Two O-Haus balances that will measure to the nearest 0.1 g are required at all sites for processing trout and/or other gamefish. These include the 600, 1,200, and 2,000 g scales. A 1.2 or 2 and 6 kg balances may also be needed at high volume sites or sites with other large game (e.g. brown trout) or nongame (e.g. eel) fish species. The 6,000g scale only reads to the nearest 0.5 g. Each scale will need to be calibrated on site with the calibration weights provided. Make sure that a full range of weights is present in the Pelican® cases for the calibration of each balance taken to the field.

Extra Batteries:

Scales take AA and 9v batteries. Two 9v, and twelve or more AA should be carried every day. The Marsh-McBirney flow meter takes two D. These should be stored in a waterproof container.

Rubber Gloves:

These gloves are a critical safety element by guarding personnel against electric shock. Several sizes and lengths are available but each person on or assisting the stream crew is required to wear them at all times when the electrofishing units are in operation. Gloves are “Sol-vex” gloves and are not rated for electricity. However, they do guard against indirect electrical accidents.

Polarized Glasses:

Polarized glasses are to be worn by the entire stream crew. These glasses dramatically reduce surface glare and thus enabling the crew to spot fish more readily. They also serve as eye protection from net poles and tree limbs.

Fish Key:

Condensed from Jenkins and Burkhead, 1994, this key represents most of the species known to inhabit park streams. Several copies are available in the clipboards, all on waterproof paper.

100m Tape:

The 100m/300' open reel fiberglass measuring tape is used to measure the total lengths and to mark transect locations at the monitoring sites. Each 10m interval (i.e. transect) on the tape has been marked with colored electrical tape.

30m Tape:

This shorter (30m/100') measuring tape is used for measuring stream widths at each of the 10m cross sections and for delineating width intervals when measuring stream flow. Consider taking two when you have larger crews.

Marsh-McBirney Flow Meter:

The primary unit for measuring stream velocity is the Marsh-McBirney model 2000 "Flo-Mate".

Top Setting Metric Wading Rod:

This device serves to position the flow meter probe at the appropriate depth in the water column for measuring stream velocity.

Depth Stick (graduated in .01m):

Unlike the wading rod, the depth stick is a 1.5m x 1" section of treated wood dowel that has been marked at .01m intervals for measuring channel depths at each of the 10m cross sections.

Compass:

While not a critical component of the fish or stream sampling effort, a hand-held compass should be included with the sampling gear for all of the interior sampling sites.

Clinometer:

This is a small hand-held instrument used for measuring the percent (%) gradient of stream sites. In using the clinometer, hold the instrument such that the round side-window faces to the left. The instrument is aimed by tilting it up or down until the hairline in the middle of the

window is at the top edge of the point to be measured. Make sure to read and record the percent (%) scale.

GPS Unit:

GPS units currently in use are Garmin handheld units. Trimble units can be used if higher accuracy is needed. Coordinate all GPS activities with the lead biological technician.

Hand-Held Radios w/Batteries:

The portable radios used by park staff are Bendix-King model DPH5102Xs. These are equipped with rechargeable batteries that should be checked prior to leaving for the field. Due to the location of monitoring sites in steep watersheds, the whip antenna should be installed on one of the units for better transmission/reception. The crew should pack at least two of these portable radios with batteries in the field at all times. Careful attention needs to be paid to the repeater the radio is set on for proper reception and transmission.

First Aid Kit:

Items in the first aid kit include CPR mask, bandages of various sizes, an eye dressing unit, gauze, adhesive tape, iodine, ophthalmic solution, aspirin tablets, forceps, scissors, instructions and other useful items. Additional first aid material may be needed under certain circumstances or for certain crew members (e.g. “epipen”). First aid kits will contain Benadryl for allergic reactions in the backcountry. This can assist with any allergic reaction including bee stings or delayed anaphylactic shock (red meat allergies) due to tick bites. Items in the kit must be replaced the day they are used.

Site Directions:

Site directions are stored in the central file drawer labeled “Historic Electrofishing Data” within the I&M building. Electronic copies are available on the O:drive (O:\WORKING\AQUATIC\FISH DIRECTIONS). Each day, the appropriate field copy should be made on waterproof paper on which individual sites should be highlighted. The fisheries chart in the hallway should be checked for the number and type of expected species such that electronic balance and bucket needs can be planned accordingly.

Field Data Forms:

The full suite of data forms required for each site includes the “Site/Water Chem/Velocity” or cover form, “Gamefish Data Form”, “Nongame Fish Data Form” and “Habitat Data Form”. These should all be copied onto waterproof paper as needed each day from originals located in the central files. Multiple copies of all forms should be taken into the field each day. This is especially true for the gamefish forms since multiples are needed at almost every monitoring site in the park. Extra forms should be kept in each of the vehicles “just in case”.

Metal Clipboards:

At least two of the aluminum clipboards will be required at each site. Three may be required at large or high fish volume sites. Clipboards contain copies of empty and completed data forms, the fish key, site directions, a fish species code list and pencils.

Pencils:

All data is recorded in pencil using mechanical pencils. Always ensure that a supply of these is present in the clipboards or on person before leaving for the field.

Hydrolab Multi-Parameter Units:

Complete Hydrolab units consist of a number of components including the multi-sensor unit, data display system, cable, and weighted sensor guard

Plastic Buckets:

Plastic five-gallon buckets are used for storing and transporting soap solution for cleaning (i.e. soaking) gear between sites.

Plastic Tubs:

The large colored tubs are used for soaking and cleaning waders. The black rectangular tubs are used for cleaning the other gear.

Soap:

Dawn dish detergent or equivalent for soaking gear in the field or at the office.

Salt:

Salt for soaking waders at the office.

Drinking Water:

Each person on the crew is responsible for packing an adequate supply of drinking water for the anticipated conditions of the day. A MSR filter is provided for crews. It is particularly important to plan ahead for the longer hikes and to anticipate personal water needs accordingly

Lunches:

Each person on the crew has different metabolic rates and other physiological factors and must plan accordingly.

SOP Revision History

All protocols, regardless of how sound they are originally, require modification as new and different information becomes available. SOP version numbers increase incrementally by tenths

(e.g. version 1.1, version 1.2...etc.) for minor changes. Major revisions should be designated with the next whole number (e.g., version 2.0, 3.0, 4.0 ...). Small changes or additions to existing methods will be reviewed in-house by Shenandoah or Mid-Atlantic Network staff. However, if a complete change in methods is sought, an outside review is required.

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #